

**TOSHIBA'S
PIXEL-PACKED
KIRABOOK**

**TWICE THE DEVICE
WITH THE PADPHONE
INFINITY**

**ASUS' 13-INCH
ULTRABOOK
HYBRID**

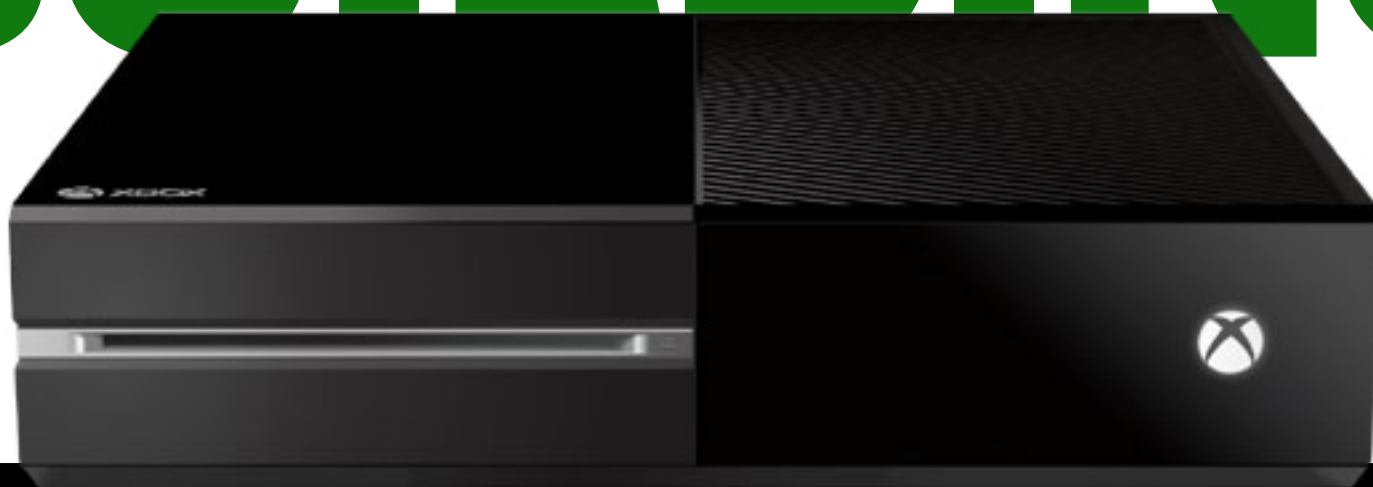
DISTRO

052413 #92

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BUILDING



THE ONE

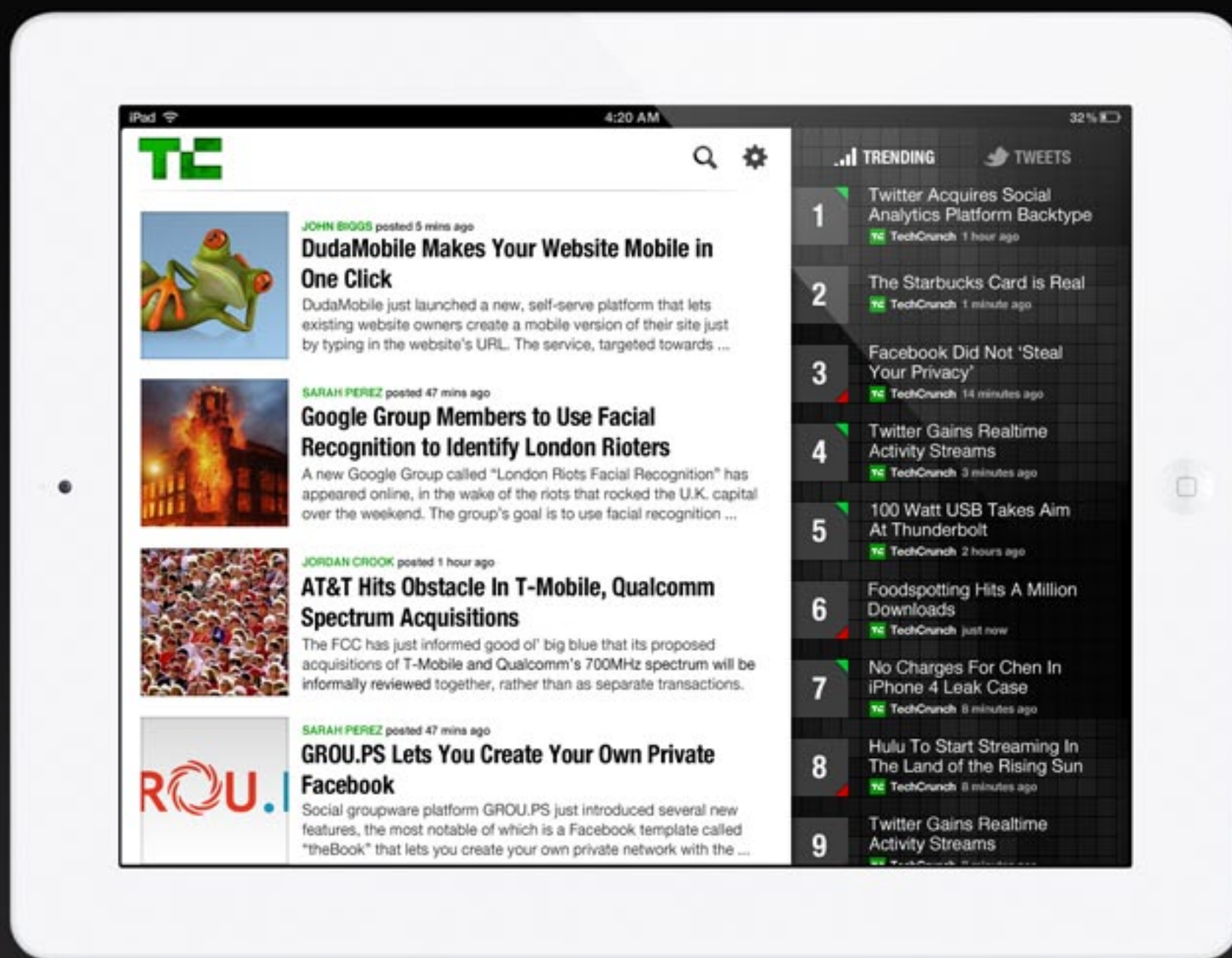


**AN EXCLUSIVE LOOK AT THE MAKING
OF MICROSOFT'S NEXT-GEN XBOX**



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ISSUE 92

DISTRO

05.24.13

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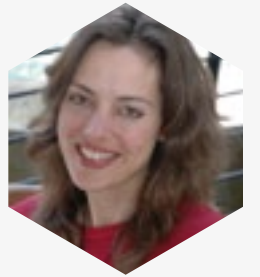
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REHASHED

**One More
Confusion, Age
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TM

TIME MACHINES

**Watch and
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ONE MORE XBOX

DISTRO
05.24.13

EDITOR'S
LETTER



Can you believe we've had the Xbox 360 since 2005? Every time I mention that in a post, I have to do a little fact-checking. As a child of the two- or three-year console cycle, a system still going strong after eight seems inconceivable. Finally, it's being put out to pasture — somewhat unceremoniously. The Xbox One is its successor and, with no backwards compatibility for disc-based or downloaded games, those looking to make the leap to the next generation in the fall will already want to start weaning themselves from Microsoft's current wunderconsole. It'll make it easier for both of you when it comes time to unplug it.

And you probably will want to unplug it and make the upgrade, though to be fair there's plenty to be cynical about with the Xbox One. So, I'll get that out of the way first, starting with the name. Microsoft is trying to send the message that the new Xbox is the only device you'll need to control your living room. That may be, but One? HTC, of course, called its latest flagship the One, but that was a case of a company distancing itself from previous, complicated naming schemes and going with something simpler. Here, there

have been only previous generations of the Xbox. Calling the third one the "One" is simply confusing. Still, it beats "Xbox Foo," which is what Microsoft's initial press release mentioned. Someone, it seems, got the memo on the official name a little too late.

Then there's the design. It is, basically, a big black box with a bunch of vents. I've seen ATX PC cases that look more stylish. It's disappointing that both the Xbox One and the PS4 are basically customized PCs on the inside, but do they really need to look like PCs on the outside, too? And then there's the OneGuide TV experience, driven mostly by a combination of HDMI passthrough and an IR blaster. I'm not optimistic this will be significantly better than Google TV. I'm also bummed about the (predictable and understandable) lack of backwards compatibility.

So, a total flop? Actually, I'm pretty excited. I think the graphics will be impressive once devs get their heads around it; I think Microsoft is banking on their current success to line up a suite of impressive titles; and I think the new, higher-res and smarter Kinect could finally make that a compelling addition. I also think the new control-





A first look at the One on stage at the Xbox event in Redmond.


ler, with its “impulse triggers” and ever so slightly revised design, feels amazing. Sadly, the games themselves are still a bit of an unknown, as we only saw a few brief glimpses at this week’s all-too-short event. Nice of Microsoft to save *something* for E3.

Xbox didn’t totally dominate the news cycle, however, with Yahoo making a big splash over the weekend talking of a possible Tumblr acquisition. It was long rumored, then it was dismissed and then... well, then it happened. The \$1.1 billion acquisition is a massive amount of cash for the microblogging platform. Some expressed doubt, with a whopping 72,000 Tumblr users porting their content over to WordPress in one hour on the Sunday before things got official, but Yahoo is promising to not screw things up. Things at least got off to a good start, with Flickr receiving a major redesign and its users receiving 1TB of free storage.

As we go to press, there are some shaky happenings at HTC. A series of

high-profile departures have seen the loss of members of the marketing team and even the CEO of its Asian business. Is this a sign of something looming within HTC? Or, is it a sharp correction in response to the company’s recent failings? Signs are unclear now, but hopefully this shake-up will help the company come out stronger.

Finally, Sprint closed out a deal to buy some of US Cellular’s Midwest spectrum, picking up some 420,000 customers in the process.

In this week’s Distro we’re taking you deep inside the creation of the Xbox One. Ben Gilbert got exclusive access to many of the engineers of the console and, in an incredibly detailed feature, will splay the system wide open for you. We also have our hands-on impressions with the system itself, the new Kinect and that great new controller. If that weren’t enough, we have reviews of the Toshiba Kirabook and ASUS Transformer Book, as well as the updated ASUS PadFone Infinity. We have three editorials putting the week’s gaming news in perspective and there’s also a Q&A with NASA astrophysicist Amy Mainzer. It’s a lot to take in, we know, but you can handle it. 

TIM STEVENS
EDITOR-IN-CHIEF,
ENGADGET



WIDGET WANTED, A BIT OF INVESTMENT AND CTRL+F FOR SCAM



Touch article names
to read full threads

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INBOX



GOOGLE PLAY MUSIC
ALL ACCESS

ISSUE 91,
MAY 17TH, 2013

“Google should really, really consider integrating the sound search widget functionality in this new app/service. I’d use it CONSTANTLY!”

— SHANEAGILSON

“As one of the one million paid users of Spotify, and as a major user of all Google services, it’d take a whole lot to pull me off of Spotify and into Google.

LET GOOGLE BE A LITTLE EVIL

ISSUE 91,
MAY 17TH, 2013

“As technology brings authors, developers, composers etc. closer to the consumers, publishers need to change too. No one was going to hold the publisher’s hands on this. Like Kickstarter challenging game publishers someone was going to kick these publishers into the future.”

— UVINDU

It needs an advantage, and right now, I only see limitations. I have Spotify at work on my PC, on my wife’s iPad, on my GNex phone... Heck, I have a web version that I can use on my Chromebook, if I

ever unhook it from my TV. If Google wants this to go anywhere, they need to find some hook that makes them better, not just resting on the name recognition of Google.”

— CGREGZ



HINGING ON SUCCESS
ISSUE 91,
MAY 17TH, 2013

“I love that we’re getting all these options and with the next-gen processors

it’s only going to get better. Very exciting time in tech, especially when you consider that the whole tablet/hybrid thing is really just getting started.”

— **OOLZIE**

THE ENGADGET INTERVIEW: CLIFF BLESZINSKI
ISSUE 91,
MAY 17TH, 2013

“Speaking on the SmartGlass stuff for Xbox, I really liked the SmartGlass integration on *Forza Horizon*. It was simple, but it shows the world map while you’re driving around. I prop up my tablet or laptop on my coffee table, load up the map and then while I’m driving I can quickly glance down to the full world map without interrupting my driving. Sometimes it results in a texting-while-driving type incident, and I smash into another car, but it actually is pretty awesome. I think there’s a lot of potential there for cool stuff if developers figure out how to make it work with their particular game.”

— **JONATHANADAMS**

THE RISE (AND RISE?) OF BITCOIN
ISSUE 91,
MAY 17TH, 2013

“I wish I had bought some when they were 30 cent[s] or so.”

— **BIBLEVERSE1**

“Ctrl+F for scam, ponzi, pyramid, ripoff, etc. Find nothing. Only one mention of drugs. This article is not about the Bitcoin I know.”

— **KILLHAMSTER**

SONY XPERIA SP
ISSUE 91,
MAY 17TH, 2013

“Sony has a really confusing naming scheme with all its mobile devices. They’re jumping all over the alphabet without any easy way to differentiate them from one another.”

— **ELITEBESERK**

“Love the throbbing party lights at the bottom when music is playing :-)
They should do the whole bezel in that stuff, the Japanese karaoke crowd would go nuts.”

— **MYTHICAL**



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EYES-ON

NUMARK ORBIT

Tap for
detail

TAKE
A SPIN

LIGHT
'EM UP

GET A
GRIP

NUMARK ORBIT

It's no secret that Numark has been cranking out dependable gear for DJs for quite some time. At NAMM 2013, the outfit unveiled the Orbit controller and our design sensibilities were immediately smitten. The multicolored, soft-touch gadget not only looks great, it also offers a highly functional form factor to boot.

THE DAMAGE: \$100

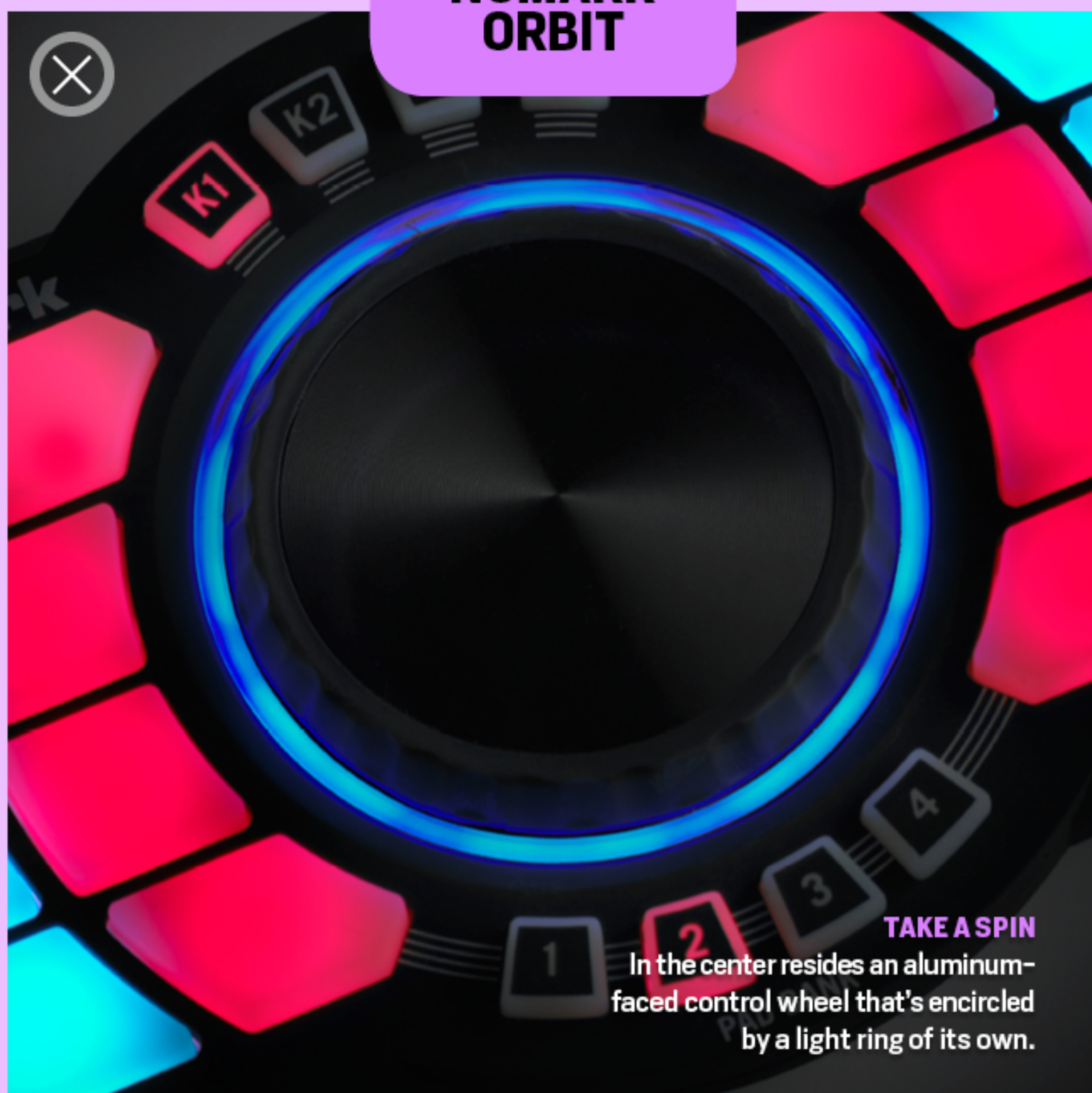


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EYES-ON

NUMARK
ORBIT



TAKE A SPIN

In the center resides an aluminum-faced control wheel that's encircled by a light ring of its own.

PHOTOGRAPHS BY WILL LIPMAN



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EYES-ON

NUMARK
ORBIT



LIGHT 'EM UP

A total of 16 backlit RGB pads offer both color and function customization to suit each set and to cater to individual aesthetic preferences.

PHOTOGRAPHS BY WILL LIPMAN



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EYES-ON

NUMARK ORBIT



GET A GRIP

The Orbit's compact stature takes the shape of a gaming controller, and thanks to its black, soft-touch exterior, it feels great in the hand.



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HANDS-ON

LG PLASTIC FLEXIBLE OLED DISPLAY



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You can't blame us for rushing to see LG's flexible OLED HD panel here at SID. First announced earlier this week, the 5-inch display sports a plastic construction, which allows it to be both bendable and unbreakable. Most alluring of all, though, is LG's intimation that the screen tech will debut in a smartphone by the end of this year. Before we get lost in thoughts about a tricked-out Optimus G, let's take a look at this early prototype.

The panel is made of plastic substrates, which are both more flexible and cheaper to manufacture than their glass counterparts. In fact, cost-effectiveness seems to be the chief objective overall. Clumsy consumers will benefit as well

PRICE: TBD

AVAILABILITY: 2013

THE BREAKDOWN: THESE 5-INCH BENDY HD DISPLAYS FEEL LIKE FILM STRIPS.

— in a smartphone, the glass above the screen could break, but the OLED panel would stay intact, resulting in lower repair costs. At the company's booth, a demo area let attendees take a hammer to the standalone display and twist it every which way — sure enough, it withstood these torture tests. In our hands, the 5-inch screen was lightweight and responsive to twists and bends; it felt like a slightly thicker filmstrip.

An LG rep told us the panel could sport a bigger or smaller size when it debuts in a smartphone later this year. And though the prototype on display here was labeled merely as “HD,” we're sure that resolution could be adjusted as well.





CAST AR

When Valve's first hardware hire, Jeri Ellsworth, tweeted back in February that she was fired from the company, we were disappointed, but also intrigued by what she meant by "time for new exciting projects." Well we finally saw what she's been up to here at Maker Faire 2013. It's called Cast AR, and it's a pair of 3D augmented reality glasses that she and former Valve programmer Rick Johnson were working on before they left.

The model we saw is still in the early prototype stages, but the concepts are already in place. Perched atop a pair of active-shutter glasses are a couple of miniature LCD projectors, which bounce images from a connected computer onto a special reflective surface at a 120Hz refresh rate. A camera module sits on the eyewear's bridge and monitors an array of infrared LEDs embedded in the reflective surface. This allows for quick and accurate head tracking.

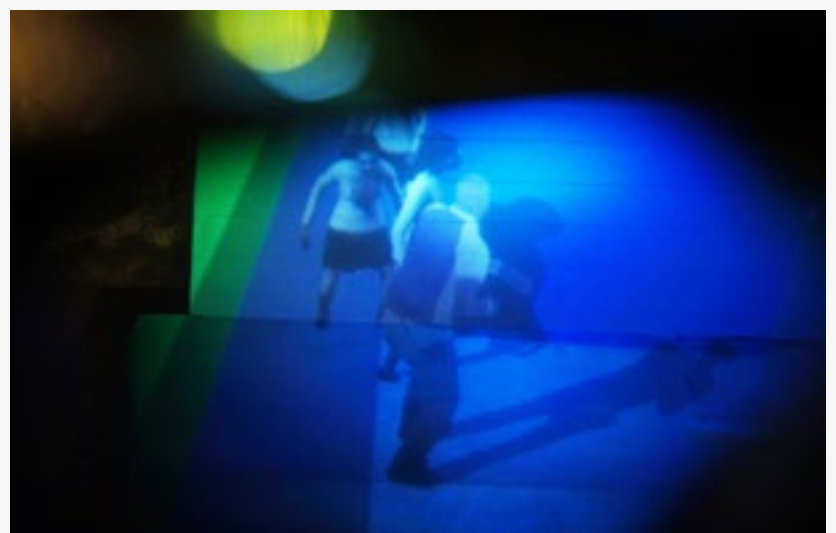
PRICE: TBD

AVAILABILITY: TBD

THE BREAKDOWN: CAST AR DOESN'T DEMAND AN ENTIRE LINE OF SIGHT, BUT STILL IMMERSES USERS IN A 3D REALM.

Unlike virtual reality goggles like the Oculus Rift, putting on the Cast AR doesn't cocoon you in another world. Even though we were immersed in a 3D environment, we could still see our surroundings and what was in front of us; the open-sided see-through glasses are purposefully designed not to close us off from reality. We also waved an LED-equipped wand around to throw a wrecking ball into a *Jenga*-style tower, which delighted us to no end. Not once did we feel nauseous or disoriented even as we bobbed and weaved.

Ellsworth's new company, Technical Illusions, plans to bring Cast AR from prototype to finished product with Kickstarter later this year to help fund the project. She wants to sell the whole kit — glasses, wand accessory and required reflective surface — for under \$200.



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ARDUINO ROBOT

There's a new kid on the Arduino block, and it's called the Arduino Robot. Launched at Maker Faire Bay Area, it's the company's first product that extends beyond single-microcontroller boards. The Roomba-like design, which we first saw in November 2011, is the result of a collaboration with Complubot. It consists of two circular boards, each equipped with Atmel's ubiquitous ATmega32u4 and connected

PRICE: \$275

AVAILABILITY: JULY 2013

THE BREAKDOWN: A ROBOT FORM FACTOR OFFERS BUILDERS A NEW AVENUE FOR ARDUINO PROTOTYPING AND TINKERING.

via ribbon cable.

The bottom board is home to four AA batteries (NiMH), a pair of motors and wheels, a power connector and switch plus some infrared sensors. By default it's programmed to drive the motors and manage power. The top board features a color LCD, a microSD card slot, an EEPROM, a speaker, a compass, a knob plus some buttons and LEDs. It's programmed to control the display and handle I/O. Everything fits inside a space that's about 10cm high and 19cm in diameter.

Pre-soldered connectors and prototyping areas on each board make it easier to customize the robot platform with additional sensors and electronics. It even comes with 11 step-by-step projects and a helpful GUI right out of the box.



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SAMSUNG 3,200 X 1,800 LCD PANEL

So, it's not the full laptop setup we were kinda, sorta expecting based on Samsung's announcement, but the Korean company's 13.3-inch, 3,200 x 1,800 panel — with a whopping 275 ppi — is still plenty impressive on its own. Though the prototype was connected to a desktop PC rather than installed in a notebook, the demo gave us what we came for: a look at that sheer pixel density.

You really have to see it to believe it — with the desktop set to the screen's native resolution, menus, icons and text all appear tiny. The benefit of such a high resolution, of course, is that you can fit more information on screen, and it's more than a little reminiscent of Apple's Retina display. The booth wasn't

equipped with internet access, so we couldn't test the panel's mettle with a trip to our site, but images on the desktop and in Samsung's pre-loaded Power-Point looked very bright and crisp.

In addition to playing up the pixel count, Samsung touted its prototype as a "green panel," claiming 30 percent lower power consumption than existing LCDs. And like the flexible LG display we saw just a bit earlier, this screen won't stay off the market for long: expect a 13.3-inch version — with touch capability — to ship in the next two months, though it may debut on a third-party laptop, not necessarily one made by Samsung. A rep told us that 14- and 15.6-inch versions would follow. **D**

PRICE: TBD

AVAILABILITY:
SUMMER 2013

THE BREAKDOWN:
LOWER POWER
USE AND 275 PPI
MAKE THIS
13.3-INCH DISPLAY
A DUAL THREAT
IN FORTHCOMING
LAPTOPS.



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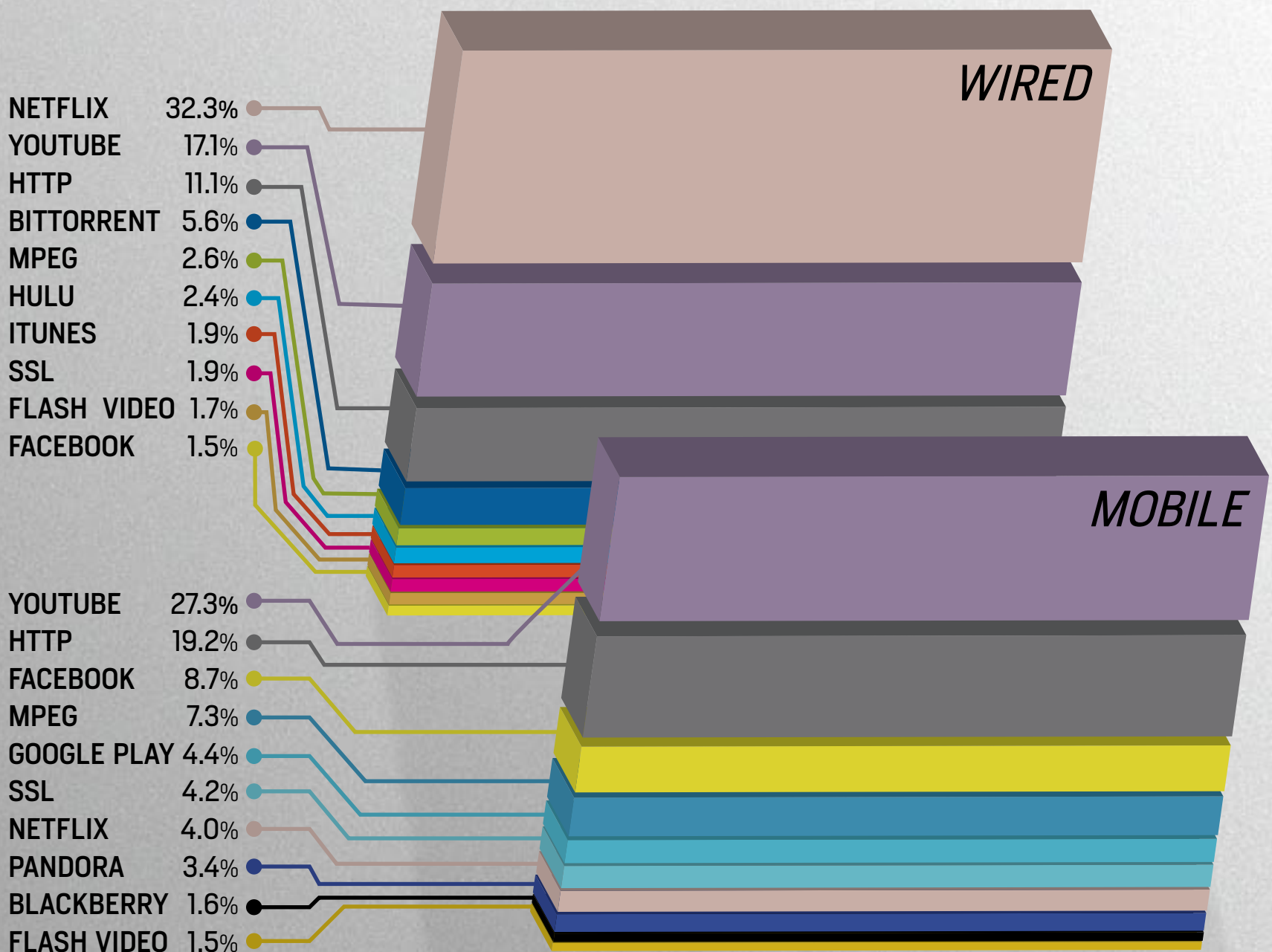


Stream Believers

When we last checked in with Sandvine's stat trackers, Netflix reigned supreme in online video traffic at home, especially downstream. It's still sitting pretty several months later, Sandvine tells *AllThingsD*, with Netflix holding a healthy lead at 32.3 percent of downstream use on wired networks this past March, possibly helped by the *House of Cards* debut. Even with some of its competition taking big strides forward — YouTube jumped up to

17.1 percent and Hulu rose to 2.4 percent — in mobile, it's a different story. Netflix use on cellular almost doubled to 4 percent, while YouTube kept an uncontested lead at 27.3 percent of downstream use. With the other top video formats preferred by people on the road: raw HTTP video (19.2 percent) and Facebook (8.7 percent), it seems to suggest that many still grab snack-sized videos on their phones instead of full movies or TV shows. — *Jon Fingas*

TOP ONLINE VIDEO DOWNSTREAM SOURCES – FIRST HALF 2013





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**In the
Programmable
World, All Our
Objects Will
Act as One**

By Bill Wasik
Wired

The “Internet of Things” may have been talked about to death in recent years, but it is still a thing, something that Bill Wasik suggests may be better described as the “programmable world” in this

cover story for *Wired*. To that end, Wasik surveys the programmable world as it exists today, and the challenges in store for the future, including what he suggests is the “existential threat” of power.

**How Michael Crichton’s
Westworld Pioneered Modern
Special Effects**

By David A. Price, *The New Yorker*

Most of *Westworld*’s special effects may have been of the practical variety, but as David A. Price explains here, a few minutes of computer-generated footage would prove to be the beginning of the modern era we know today — a feat made all the more impressive by being done on a budget.

**Netflix CEO: ‘TV in the future
will be like a giant iPad’**

By Armina Ligaya, *Financial Post*

We featured a profile of Netflix CEO Reed Hastings here last week, but this sit-down interview with the *Financial Post*’s editorial board is also well worth reading, touching on not just issues specific to Canada (where broadband caps remain a concern), but also on Netflix’s broader future.

Paul Otellini’s Intel: Can the Company That Built the Future Survive It?

By Alexis C. Madrigal
The Atlantic

This month saw a big shift at the top of one of the world’s biggest technology companies. Intel announced on May 2nd that it had chosen then COO Brian Krzanich to be its new CEO, and on May 16th he officially took over from Paul Otellini, who had held the top job for the past eight years. In this profile for *The Atlantic*, Alexis Madrigal takes an extensive look at Otellini’s legacy, talking to not just Otellini himself, but to some of his colleagues and key rivals from the likes of AMD. It also reveals what Otellini sees as a rare regret during his tenure: passing up an opportunity to work with Apple on a processor for the iPhone. “I should have followed my gut,” he says, while also earlier noting that “the world would have been a lot different if we’d done it.”



x86'D: NINTENDO'S NEXT-GEN PROBLEM



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05.24.13

FORUM

EDITORIAL

BY SEAN BUCKLEY

It didn't take long for console warriors, fanboys and a brutal media to take aim at Nintendo's Wii U. The fledgling system was relentlessly teased for its name (seemingly even sillier than that of its predecessor) and a list of specifications certain to be outdone by its competitors. The device's novel tablet controller stayed judgment for a short time, but it didn't last long — a weak launch lineup, a slow operating system and software delays soured an already judgmental community.

Wii U detractors eventually climbed atop their soapboxes to issue their final verdicts: Nintendo is doomed. A premature prophecy, perhaps, but one that became increasingly difficult to argue with: diminishing sales and third-party desertion set a negative tone for the Wii U's future. Dedicated fans (this editor among them) quickly fell into a defensive position, dismissing EA's abandonment of the platform with promises of Nintendo's own first-party wonders. Optimism reigns supreme. Still, with both Microsoft's and Sony's cards on the table, it's clear that

Nintendo is about to take another hit.

Nintendo will always be able to move its own hardware — fan-favorite IPs like *The Legend of Zelda*, *Super Smash Bros.*, *Metroid* and *Mario Kart* will see to that — but the industry has suddenly shifted in a way that makes the Wii U outright unappealing to developers. It's not a question of visual fidelity, digital ecosystems or brand recognition; it's a divide between computer architectures. The Xbox One unveiling didn't just tell us about Microsoft's next console; it also showed us that the Wii U is the last home gaming machine to use a PowerPC processor. Nintendo's latest console just became the odd man out.

The Xbox One and the PlayStation 4 will both use x86 processors, the same sort of CPU architecture found in most current desktop and laptop PCs. It's a big change — the Xbox 360, PlayStation 3 and original Wii all ran on PowerPC-based processors not unlike the silicon found in Apple products before its 2006 Intel switch. It's a somewhat arresting transition, but it's also a very smart one.






This presents a serious problem for Nintendo: several third-party studios already see it as an outdated console.

Bringing consoles closer to the common PC puts developers in a familiar environment, giving them an edge in multiplatform development. Porting a game between PC and consoles just became *that* much easier. The natural consequence, however, is that bringing that same software to the Wii U is that much *harder*. The fanboy-fueled debate over the Wii U's graphical prowess or the practicality of its funky tablet controller simply doesn't matter anymore — if we're going to call it a "last-gen" console for *any* reason, it's going to be because it's based on a "last-gen" system architecture.

This presents a serious problem for Nintendo: several third-party studios already see it as an outdated console, and this architecture gap could push even more developers away. That doesn't mean that next-gen multiplatform games can't or won't be ported to the system, but it forces developers to jump through extra hoops — and many won't make that effort until the Wii U is sufficiently popular to start with. It's a classic catch-22. This isn't a terminal

diagnosis, however. Nintendo's pulled a flailing system back from the brink before. It still has time to woo the interest of third parties, and its own library of well-loved properties will keep the console afloat — but this architecture discrepancy puts the Wii U at a severe disadvantage. Any hope the company had of a surprise comeback in this generation's console war may have just been dashed.

Still, there's an upside to being the last PowerPC console on the market. The very architecture that pulls Sony's and Microsoft's new systems ahead of the Wii U *also* limits them in terms of legacy software support. It's already been revealed, for instance, that the PlayStation 4 isn't compatible with the previous generation's save data, nor disc-based / PSN games — and its new x86 processor is to blame. It's the same kind of problem that drove Sony to equip early PS3s with the PS2's Emotion Engine processor alongside its next-gen chip: native code can't translate across CPU architectures. No surprise then that Microsoft's latest console has the same limitation, making the Wii U the *only* modern console on the market to offer full backwards compatibility. It's a small comfort to Nintendo fans discouraged by the Wii U's lackluster third-party support, but is it enough to secure Nintendo's place in the next console cycle? Early indicators aren't looking good. 

Sean a lifelong gamer, a comic-book nerd, and an Eagle Boy Scout. He also writes for Engadget. What else is there to know?



ONE BOX TO RULE THEM ALL

DISTRO
05.24.13

FORUM

SWITCHED
ON

BY ROSS RUBIN

WHEN MICROSOFT INTRODUCED the original Xbox, the company had a lot to prove. The console newcomer promised that it was laser-focused on building a great system for games. There wasn't much to distract it. In a time of DVDs and dial-up, "convergence" in the space was focused on the ability for consoles to play back movies rented at Blockbuster.

But everyone knew that the new kid on the block had an agenda beyond taking its share of industry profits away from Nintendo and Sony. Particularly versus the latter, Microsoft knew it would be engaged in a war for the living room and the future of digital entertainment distribution including, but beyond, games. Nothing came close to matching the processing power that consoles had brought to the living room, but no one had really cracked the broader application beyond disc-based games. It surely wasn't web browsing, as Nintendo and Sony had tried. Still, as streaming ser-

vices from Netflix, Hulu, Pandora and others began to proliferate across lots of different add-on boxes, it made sense to add them onto Xbox Live (even if the programming wasn't) as well as the PlayStation Network.

However, the spreading of the Zune brand's ashes and the sale of the pay TV, vendor-focused MediaRoom division to Ericsson were the final precursors to the end of the hidden agenda's secrecy. Xbox One is charging into the living room with the ferocity of one of its exquisitely rendered *Call of Duty: Ghosts* soldiers. Mere streaming boxes




“Xbox One is charging into the living room with the ferocity of one of its exquisitely rendered *Call of Duty: Ghosts* soldiers.”

may be prepared to carry live streams of broadcasters. However, not only will the Xbox One incorporate the pay TV services consumers are already paying for, but it will also allow them to navigate those services by voice, switch between them and other Xbox apps for music and web browsing and even interact with them in some cases. And the Xbox One won't just be a passive pipe for the TV already available; Microsoft will begin to develop its own programming as Netflix and Amazon have done.

Mere control of the TV stream is hardly a recipe for success for non-cable products. Years before the Logitech Revue failed to marry broadband and broadcast came TiVo. WebTV tried the same with WebTV Plus. However, while high-budget game titles may not have universal appeal, they have been desirable enough Trojan horses to bring the Xbox and its major competitors into about a third of US homes. Before Blu-ray players, DVRs and even the Beta-max, there were game consoles. With the opportunity for personalized programming and natural navigation, that

tail is now poised to wag the dog.

The Nintendo Wii U, the first of this generation of consoles to launch, made its bid for TV control and overlay with its TVii feature. Nintendo TVii relies on TiVo for the capabilities of a DVR, a domain in which Microsoft has many years of experience with its long-underutilized, but well-regarded Windows Media Center. Microsoft at least played to those capabilities by mentioning recorded programming at its Xbox Reveal event, and we know that the Xbox One can both record gameplay (and send it to the cloud like the PlayStation 4), as well as accept external USB 3.0 hard drives.

Microsoft will actually have another opportunity to serve as it makes its E3 announcement a few hours before the ball lands in the court of Sony, which has previously offered TV viewing and recording capability with PlayTV in Europe. With a richer living room legacy than either of its main competitors, Sony will be under the gun to show that it has not abandoned its heart in the living room as it has turned its head toward the cloud. 



SOME QUESTIONS ABOUT THE XBOX ONE



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FORUM

THIS IS THE
MODEM WORLD

BY JOSHUA FRUHLINGER

Now that Microsoft has given its quick reveal of the new Xbox One game console / set-top box, we have a pretty good idea of what we should be expecting once the machine comes out. We know how it'll be controlled; we know what games we'll be playing on it; and we know how it will keep us connected and entertained.

But we don't know if people will use all these new things. Are we ready to look at our game consoles as more than a game console? Are we already there? I mean, we all use Netflix on our machines, right? May as well let them run our TV viewing too, right?

Right?

So many questions. Here are some that I can't help but ask now that the pieces of One are coming together:

Will the new focus on TV, sports and episodic entertainment become a distraction? Of all the things announced, perhaps the most exciting was a live-action *Halo* series alongside blockbuster stuff-maker Steven Spielberg. Sure, a

Halo series could be tons of fun, but will they charge us for it? How much? Will it be worth it? Would we rather just have another *Halo* game? And what if this show is terrible? Will that hurt the *Halo* franchise image? I mean, we're talking Spielberg here, but even he isn't infallible. Remember *Terra Nova*?

Will the always-on nature of the One become a nuisance or an enabler of fun and good times? Microsoft could do amazing things with this: reminders when a show is on, live sports statistics from reputable content providers, interesting supplemental information from the network. However, this could all go terribly wrong: gameplay requests in the middle of a tense movie scene, social updates when you're just watching some Anthony Bourdain on a chill Sunday evening, force-fed Bing results when all you want is the Wiki. Could go either way, but one has to ask.

Has Microsoft left behind the women and children? Maybe this presentation was for early adopters, and — sure




“Will the always-on nature of the One become a nuisance or an enabler of fun and good times? Microsoft could do amazing things with this.”

— women watch sports and play *Halo*. But... NFL, *Halo*, ESPN? Surely they're leaning into a sports-watching, grunt-killing male audience that's going to line up on day one and drop some cash on the One before grabbing a six-pack and beef jerky. Is this a heavy swing away from the Wii-like, family-friendly world they created with the Xbox 360? I mean, really, can I keep my cute little avatar on the One?

Are we still doing the voice and gestures? I don't know about you, but I am content to control my TV in silence and stillness with a remote. Instead, Microsoft is again telling us that we'll talk to our Xbox (“Xbox on!”) and gesture whatever it is we want to do on screen. Surely there will be remote equivalents to all of these things, rendering my question relatively moot, but the focus on these things is curious. Perhaps more people like talking to their TVs

and waving their hands than I realize, but call me curious. They've been telling us Kinect is going to change the way we use our televisions for more than two years now, and I still use my remote. But maybe that's just me? Do you Kinect owners use gestures and voice to control your movies?

Live stats and information to accompany television viewing — especially sports as they suggested — sounds great on the surface (heh). Sure, I want to know a pitcher's strike-out-per-inning numbers when they bring him in, or even see a hitter's hot zone. Having it show up right on the same screen I'm watching also sounds super great. Heck, maybe I even want to engage in some social banter with other fans while I watch. But I have to ask: Do I really want to do this on the same screen when I'm already doing it on my tablet, smartphone and laptop? Is this a necessity or a way to make potential content partners happy? Will we use it?

Finally, will we miss backward compatibility? This is always a hot topic when new consoles are launched and then it tends to fade away. Console makers that offer it are seen as benevolent and kind to current fans. Those that don't are seen as restrictive and ungrateful to current fans. But the question is: How many of us really use backwards compatibility? To those who own newer PS3s, do you miss not being able to play your PS2 games or are you over it already? 



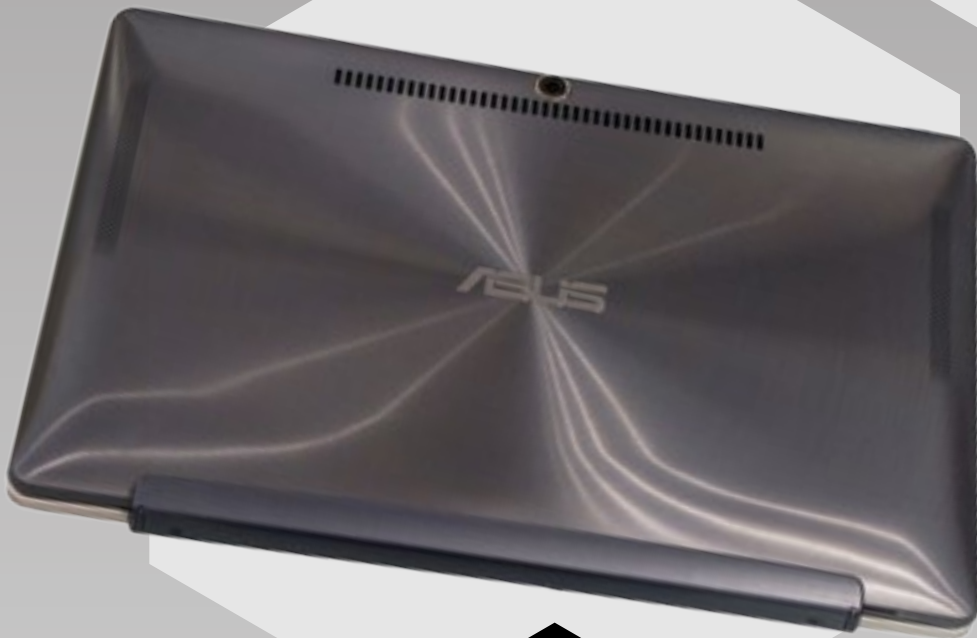
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TOSHIBA KIRABOOK



Toshiba joins the premium game with the **Kirabook**, a speedy machine with a high-res screen, but its share of drawbacks, too
By Dana Wollman

It's not like Toshiba is new to laptops — it's been making them for decades — but for whatever reason, US consumers don't seem to trust the company with top-shelf products. Four-hundred-dollar machines, maybe, but a designer laptop? An Ultrabook, no less? Toshiba has an image problem, to be sure, and the executives in Tokyo know it. The answer, they hope, is to start fresh with a clean slate. The company recently announced a new family of premium devices, called Kira, with the 13-inch Kirabook being the inaugural product.



At first blush, it has all the trappings of a flagship machine, with an all-metal chassis, backlit keyboard, 8GB of RAM, a two-year warranty and a 2,560 x 1,440 display, one sharp enough to rival the Chromebook Pixel and Retina display MacBook Pro. In fact, this is the first Windows laptop to offer such a high-resolution panel, which gives Toshiba a big opportunity indeed: to lure people who still haven't found their perfect Ultrabook. The problem with "perfect," of course, is that it comes at a price: \$1,600 and up, in this case, and the touchscreen isn't even standard. That leaves just one question, then: is it worth it?

LOOK AND FEEL

Whether Toshiba ultimately succeeded in strengthening its reputation really isn't for us to say — only time (and laptop sales) will tell if consumers have more confidence in the brand than they did before. We'll say this, though: the Kirabook is generally a tastefully designed machine, and durable, too. A good place to start might be the magnesium used on both the lid and chassis, which Toshiba claims is 90 percent stronger than the aluminum used

Is it \$1,600-nice?
Not quite, but then
again, few things are.

on the MacBook Air. Of course, we've no way of confirming that claim, but it's definitely clear the magnesium brings all sorts of benefits: it's lightweight, resistant to scratches and it looks dignified, too, in the way metal laptops usually do.

On the inside, it makes use of the same honeycomb construction as Toshiba's older Portege machines, which makes it exceptionally durable, especially in the palm rest area (you know, the place you're likely to hold it with one hand). And yet, as resilient as this thing is, we can't get over how light it feels. At 2.9 pounds, it weighs about the same

The whorl of the intake fan grille is found along the bottom.





Ports include HDMI, USB 3.0 and a memory card reader.

as the 13-inch Air, and that's with a touchscreen on board. Without the touch panel, the weight comes down to 2.6 pounds, which is pretty insubstantial — even for an Ultrabook. Despite its small size, though, it still packs more ports than you'll find on most ultraportables: an HDMI socket, memory card reader, headphone jack and three USB 3.0 ports (painted black on the inside for a more subtle effect). The only thing you're missing is an Ethernet port, which you'll only find on the thickest Ultrabooks anyway.

So we've established the machine is nice, but is it \$1,600-nice? Not quite, but then again, few things are. If we could have Toshiba rewind the design process and reconsider a few of its decisions, we'd start by nixing the tacky chrome trim ringing the trackpad, along with the Harman / Kardon branding on

the right end of the palm rest (HP, we hope you're reading this too). The front edge can be uncomfortably pointy, especially when you're carrying it in-hand. As sturdy as the chassis is, the lid exhibits a disturbing amount of flex. We'd also prefer not to see any bump or ridge where the keyboard

meets the chassis. The intake fan on the bottom is unsightly and, as you'll find, it doesn't even do an efficient job of managing heat. At the very least, the Kirabook has most of the things an expensive machine should have: a metal chassis, a slim wedge shape, a backlit keyboard and a high-res, nearly edge-to-edge glass display. But if you ask us, it's not striking enough to warrant such a lofty price.

KEYBOARD AND TRACKPAD

If you bought the Portege Z835 and came away disappointed with the typing experience, well, the arrival of the Kirabook won't do you much good. But you can at least know that Toshiba took your complaints to heart. After many customers (and reviewers!) criticized the keyboard for being too cramped, Toshiba made an effort to improve the layout, with deeper travel and some





The keyboard here is much improved over previous models.

subtle contouring at the top of each key. And it worked: the Kirabook's keyboard is, indeed, more pleasant to type on. Anecdotally, we were able to fly through emails at a fast clip, making barely any typos along the way. If you'll allow us to reset your expectations a bit, "deeper travel" is a relative phrase — the buttons here are still pretty flat, though they offer more feedback than Toshiba's earlier Ultrabooks. And besides, on a machine this thin, any sort of keyboard bounce amounts to a welcome surprise.

As you'd expect from a machine of this caliber, the Kirabook comes standard with keyboard backlighting, which you can turn off by pressing Fn-Z. If

you look around, you'll find some other functions embedded on the main keyboard, like the 1 and 2 buttons, which you can use to zoom in and out of the Start menu. There's also a magnifying glass on the left end of the spacebar, but we strongly suggest ignoring it, if possible: onscreen objects can look pretty ugly once you start zooming in.

The Kirabook's Synaptics trackpad is wide and tall, leaving you plenty of space for two-finger scrolls, pinch-to-zooming and all the gestures native to Windows 8. Like other laptops we've seen, it actually handles those more complex maneuvers reasonably well, but it struggles with single-finger tracking. In particular, you might find that the cursor doesn't



move when you drag your finger across the trackpad. Even when the cursor does move, it doesn't always go where you want it to, or it stops short on the screen before you get there.

Fortunately, as we hinted, the touchpad feels much less stubborn when you're doing things like scrolling with two fingers. Pinch-to-zoom is pretty fluid, too, though we found it worked better in some apps than others. For instance, we sometimes weren't able to pinch with a thumb and index finger; just the index and middle fingers. Other times, though, the pad registered a thumb just fine.

DISPLAY AND SOUND

With a 13.3-inch, 2,560 x 1,440 display, the Kirabook is the first Windows laptop with a screen sharp enough to take on the Retina MacBook Pros and the Chromebook Pixel.

It's a tremendous opportunity for Toshiba and indeed, it mostly follows through with a stellar viewing experience. Movies look fantastic, colors are vibrant and the 220-ppi screen is about as sharp as you'd expect, which is to say you won't see a hint of pixelation at the native resolution.

Depending on the

content, anyway: many of your favorite desktop apps won't look right at that resolution, a problem we found with the original Retina display MacBooks too. Things just don't scale properly, so you could end up with tiny buttons, tiny search fields or web pages that don't gracefully scale to fill the whole screen. And when objects do fill the screen, they sometimes look blurry and stretched out. As it happens, Toshiba included a utility to help toggle between different text and screen settings, but you have to sign out of Windows any time you want to switch, which is tedious.

If anything, we wish the viewing angles were a little more forgiving. Toshiba says the Kirabook does, in fact, have some sort of wide-viewing-angle technology inside, but that it's not IPS.

Whatever it is, it doesn't do a great job preserving

Toshiba went all out on the Kirabook's 2,560 x 1,440 display.



the color and contrast at odd angles. Head-on, the display is gorgeous and to its credit, it's readable from lots of different angles. But even if you push the screen forward slightly, the colors start to become distorted. And from any angle, the glossy finish tends to reflect a lot of light. All told, we wouldn't categorize this as a dealbreaker, but you can definitely color us disappointed: we rather hoped the first-ever Windows laptop with this kind of resolution would offer flawless screen quality too.

As we mentioned, the Kirabook has Harman / Kardon's audio technology on board, much like Toshiba's other high-end laptops. So far as we can tell, the main benefit is that the volume gets loud — loud enough that you don't have to bother with the distortion-prone high-end range if you don't want to. And you won't want to. Even with the volume set to 50 out of 100, we could easily enjoy various Kanye West songs (more or less) as they were intended to be heard, though depending on how good your hearing is you could probably get away with 25 out of 100 in a quiet space.

PERFORMANCE AND BATTERY LIFE

We'll dispense with the benchmark scores for the time being: all you need to know about the Kirabook is that it's noisy. It's noisy when it's working, and it's noisy when it's doing absolutely nothing. More than once, the sound of the fans caused people nearby to stop what they were doing and gape at the

WINDOWS 8 SYSTEMS	BATTERY LIFE
TOSHIBA KIRABOOK	5:12
ACER ICONIA W700	7:13
SAMSUNG SERIES 9 (13-INCH, 2012)	7:02
MACBOOK AIR (13-INCH, 2012)	6:34 (OS X) / 4:28 (WINDOWS)
DELL XPS 14	6:18
SONY VAIO T13	5:39
LENOVO IDEAPAD YOGA 13	5:32
DELL XPS 12	5:30
SAMSUNG SERIES 5 ULTRATOUCH	5:23
ASUS ZENBOOK PRIME UX31A TOUCH	5:15
ASUS ZENBOOK PRIME UX51VZ	5:15
TOSHIBA SATELLITE U845W	5:13
TOSHIBA SATELLITE U845	5:12
ACER ASPIRE TIMELINE ULTRA M3	5:11
TOSHIBA SATELLITE U925T	5:10
LENOVO THINKPAD X1 CARBON	5:07
ACER ASPIRE TIMELINE ULTRA M5	5:05
LENOVO THINKPAD X1 CARBON TOUCH	5:00
SONY VAIO DUO 11	4:47
ACER ASPIRE S5	4:35
MSI SLIDEBOOK S20	4:34
ASUS ZENBOOK PRIME UX21A	4:19



wheezing machine sitting before them. This thing is so easily overwhelmed, in fact, that we could barely run PC-Mark 7, a Windows benchmark so basic it works on even the lowest-end machines. Sure enough, though, that test caused the fans to spin noisily, the keyboard deck to heat up and the screen to freeze, leaving us no choice but to perform a hard reset.

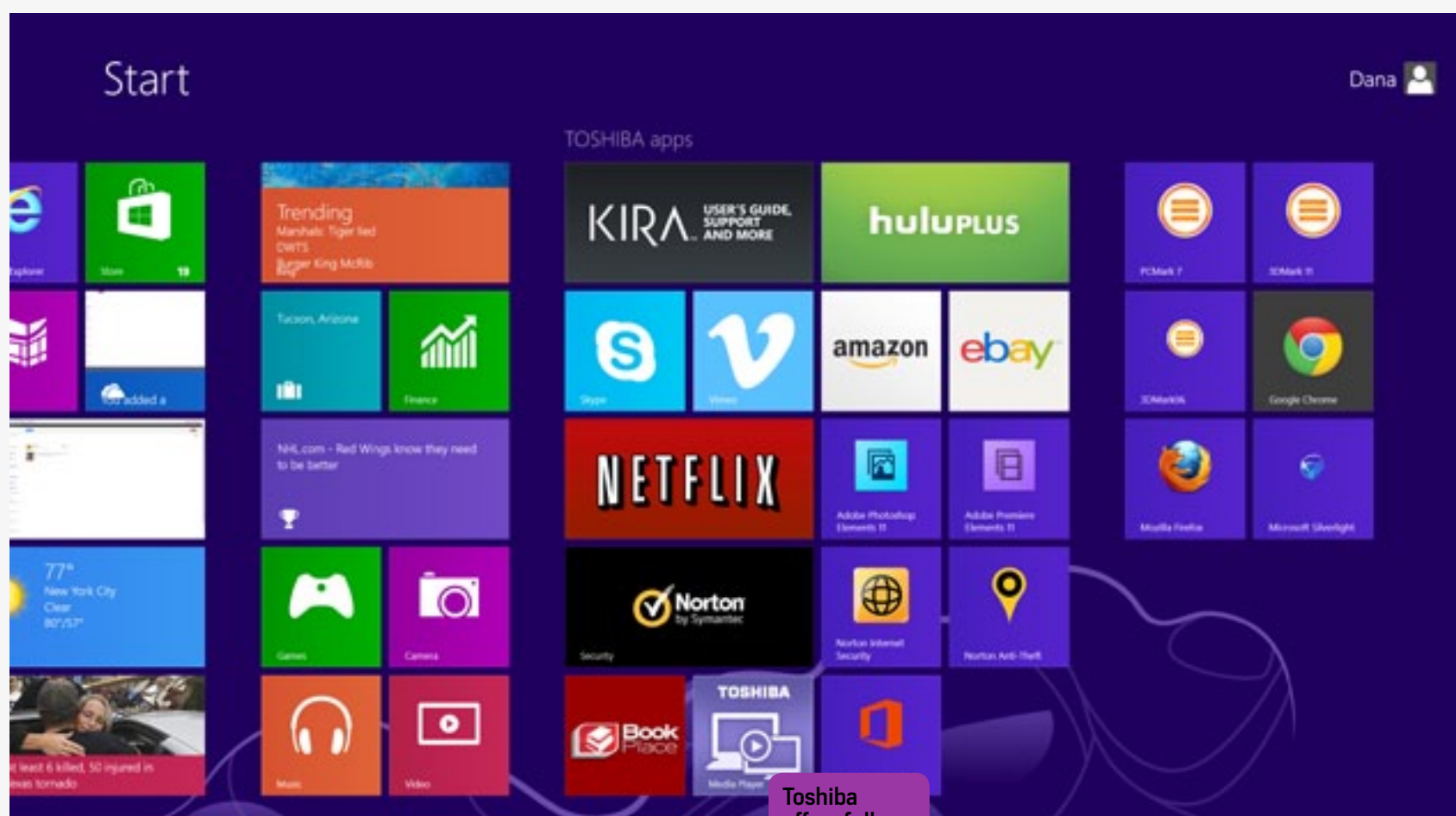
It was a similar story with 3DMark11, which should say something

about how much gaming you can expect to do on that high-res screen. Occasionally, the system even piped up after it had been sitting idle, with no programs running. To be fair, there were plenty of times when it ran quietly, but it's tough to predict when the noise is going to become a distraction.

And that's a shame, really, because the Kirabook's raw benchmark scores are smoking. With a 2GHz Core i7-3537U CPU and eight gigs of RAM, it's capable of

BENCHMARK	PCMARK7	3DMARK06	3DMARK11	ATTO (TOP DISK SPEEDS)
TOSHIBA KIRABOOK (2.0GHZ CORE i7-3537U, INTEL HD 4000)	5,275	5,272	N/A	553 MB/S (READS); 500 MB/S (WRITES)
ACER ASPIRE S7 (1.9GHZ CORE i7-3517U, INTEL HD 4000)	5,011	4,918	E1035 / P620 / X208	934 MB/S (READS); 686 MB/S (WRITES)
MSI SLIDEBOOK S20 (1.8GHZ CORE i5-3337U, INTEL HD 4000)	4,043	3,944	E1,053 / P578	484 MB/S (READS); 286 MB/S (WRITES)
ASUS TAICHI 21 (1.9GHZ CORE i7-3517U, INTEL HD 4000)	4,998	4,818	E1,137 / P610 / X201	516 MB/S (READS); 431 MB/S (WRITES)
MICROSOFT SURFACE PRO (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,673	3,811	E1,019 / P552	526 MB/S (READS); 201 MB/S (WRITES)
LENOVO IDEAPAD YOGA 13 (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,422	4,415	E917 / P572	278 MB/S (READS); 263 MB/S (WRITES)
TOSHIBA SATELLITE U925T (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,381	4,210	E989 / P563	521 MB/S (READS); 265 MB/S (WRITES)
DELL XPS 12 (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,673	4,520	N/A	516 MB/S (READS); 263 MB/S (WRITES)





PCMark 7 and 3DMark06 scores that fall well into the 5,000 range, with boot-up times hovering around 10 seconds. I/O speeds are top-notch as well, with read / write rates topping out at 553 MB/s and 500 MB/s, respectively.

Toshiba rates the Kirabook's 52Wh battery for a little over six hours, which translates to around five in our grueling battery rundown test (video looping with WiFi on). In particular, it lasted an average of five hours, 12 minutes, which isn't as long as advertised, obviously, but at least matches other touchscreen Ivy Bridge Ultrabooks. The Kirabook also deserves points for keeping pace with heavier machines like the Lenovo IdeaPad Yoga 13 — given that this thing weighs just 2.9 pounds, we reckon its runtime could've been a lot worse. In any case, though, if five hours and change isn't

Toshiba offers full versions of MS Office and more.

good enough, the best we can suggest is that you wait for a possible Haswell refresh. Who knows? Maybe Haswell will help with the overheating issue too.

SOFTWARE AND WARRANTY

Like HP's been doing with its high-end Spectre machines, Toshiba is attempting to justify the lofty price by throwing in full versions of popular programs, and offering a longer-than-usual warranty. Chiefly, that bonus software includes full versions of Adobe Photoshop Elements 11 and Premiere Elements 11; Microsoft Office; and a two-year Norton Internet Security subscription. Also on board: Netflix, Vimeo, Hulu Plus, Amazon and eBay. And ... that's it. Not a clean Windows install by any means, but at least there's no trialware.



As for that warranty, the standard protection plan includes two years of coverage with a dedicated phone support line promising near-instant pickup times, as well as support for questions that don't fall under the technical support umbrella, *per se*. (Think: "How do I find my way around Windows 8?" not that any of you would ask that.) Also, if you care, those phone technicians are all based in North America, which is apparently something Toshiba's customers have been asking for. That helps explain the \$1,600 price somewhat, in that Dell, HP and other companies charge between \$90 and \$100 for a two-year plan. Even without it, though, this would be an expensive piece of kit.

CONFIGURATION OPTIONS

This section is going to be short and sweet, and you

The Kirabook sports the traditional Ultrabook wedge shape.

have Toshiba to thank. Since 8GB of RAM, 256GB of storage and that 2,560 x 1,440 display all come standard, there's very little room for differentiation between the various configurations. In all, there are three models to choose from, starting with a non-touch, Core i5 version for \$1,600. If you want a touchscreen (of course you do — this is Windows 8), you'll need to step up to the \$1,800 model, which also has a Core i5 processor. Finally, for \$2,000 you get the full enchilada: a touchscreen computer with a Core i7 processor inside. Whichever you choose, you're looking at Ivy Bridge processors — at least for now. Something tells us that a Haswell refresh is coming, though: Toshiba worked too hard on this thing *not* to update with the newest components.



THE COMPETITION

Until Intel launches its new, battery-life-improving Haswell processors at Computex, you'd be crazy to purchase a laptop right now. Lots of ultraportables will be on display at the show, with ASUS and Acer already confirmed to host their own press conferences. So if you've been waiting for a replacement to the Acer Aspire S7 or any of ASUS' touchscreen Zenbooks, your patience might be rewarded soon.

Separately from Computex, we wouldn't be surprised if Apple refreshed the MacBook Air sometime this summer (as it always does), this time with a fourth-generation Core processor and a sharper screen. The Kirabook, too, will probably get a CPU refresh within the coming months, so even if you're fond of it, now might not be the best time to buy.

WRAP-UP

There's no question the Kirabook is Toshiba's best Ultrabook to date. But is

it good enough to win over wary consumers? We're inclined to say no, at least at this price. For all the things Toshiba got right (attractive design, improved keyboard, solid specs, generous warranty) there are a few important details it overlooked. There's the 2,560 x 1,440 display with the narrow viewing angles, and the noisy fan that drowns out the otherwise fast performance. Despite all that, it's still a good machine in many ways, but we'd suggest waiting for a possible price drop, and maybe even a Haswell refresh a few months down the road. In fact, we wouldn't suggest buying *anything* until other PC makers reveal their summer lineups. Who knows? A month from now, Toshiba might not be the only game in town for high-res Windows laptops. **D**

Dana Wollman is Reviews Editor at Engadget, a marathoner, lover of puns and a native Brooklynite.

BOTTOMLINE

TOSHIBA KIRABOOK \$1,600+



PROS

- Brilliant 2,560 x 1,440 screen
- Comfortable keyboard
- Generous warranty, software package
- Fast boot-up

CONS

- Exceptionally loud fan
- Limited viewing angles
- Expensive, touchscreen not standard

BOTTOMLINE

The Kirabook is Toshiba's best ultraportable to date, but it's still not quite good enough — at least not at this price.



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REVIEW

ASUS TRANSFORMER BOOK TX300



ASUS goes big with the Transformer Book hybrid, offering extra power, storage and a form factor for the niche 13-inch tablet crowd
By Dana Wollman

For a while, it looked like ASUS' Transformer Book would turn out to be vaporware: after debuting to much fanfare a year ago, it encountered numerous delays, and even missed the crucial holiday shopping season. Now it's finally here, priced at \$1,499 with a Core i7 processor, a 13.3-inch (1080p) screen and a detachable keyboard dock housing both a spare battery and a 500GB hard drive. The problem is the timing: Intel is about to launch its new Haswell chips, and here's the Transformer Book, arriving on the scene with a lofty price and a year-old CPU.



It'd be easy enough to tell you just wait for a refresh, which is how we've been ending all of our PC reviews in the weeks leading up to this year's Computex. But it's still worth investigating whether the Transformer Book (aka the TX300) is a compelling idea. Though we've seen many tablet hybrids (the Surface Pro, etc.), they've mostly had smaller 11-inch screens. So what happens when you take that form factor and stretch it to accommodate a bigger screen — and a more spacious keyboard? And how does it compare to all those convertible options out there, like the Lenovo IdeaPad Yoga 13 or the Dell XPS 12? Let's have a look.

LOOK AND FEEL

The Transformer Book is, at its heart, a mashup between a laptop and a tablet (a very big tablet, we might add). So it makes sense that it looks like the love-child between ASUS' Zenbook Prime Ultrabooks and its various Transformer products. The tablet itself has the same spun-aluminum back as the Infinity tablet, done up in a familiar dark grey. Meanwhile, just like last year's Zenbook laptops, the keyboard dock takes on a pale champagne

How often are you going to use your 13-inch Ultrabook as a tablet?

color, which carries over to both the main deck and the back side. Basically, then, it's a two-tone, black-and-white cookie of a notebook, with dark metal blanketing one half and a lighter material covering the bottom. It's an unconventional choice, but it works.

Once we reacquainted ourselves with the familiar design language, we started to realize how *heavy* this thing is. In total, it clocks in at approximately 4.2 pounds — considerably more than other 13-inch touch machines — with the tablet and dock each weighing in at 2.09 pounds.

ASUS maintains the familiar spun-metal exterior.





The keyboard houses an additional battery and a 500GB drive.

It might seem odd that the dock weighs as much as the tablet, but consider this: the keyboard houses both a 3,200mAh battery *and* a 500GB hard drive to complement the 128GB SSD inside the tablet. (HP's 13-inch Split x2 hybrid has a similar setup.) Likely because of these added features, the Transformer Book's keyboard accounts for much of the total thickness as well: the two together measure a fairly plump 0.92 inch thick, but the tablet itself is only 0.4 inch. That's not bad at all considering there's a frickin' *Core i7 processor* inside, along with a fan to help keep it cool.

That said, you'll probably be most impressed with the Transformer Book

if you intend to actually use it in tablet mode. As a standalone slate, it weighs considerably less than the 3.3-pound Yoga 13 or the 3.35-pound Dell XPS 12. Relatively speaking, it's more comfortable to use, though it's still a little unwieldy. And as a *laptop*, the Transformer Book weighs more than either of those machines. A lot more. And you have to wonder if it's worth it. How often are you going to use your 13-inch Ultrabook as a tablet? And is it really that important that your PC take on the same form factor as an iPad or an Android tablet? Both the Yoga 13 and XPS 12 have hands-free tablet modes, and they make room for big keyboards too. It would seem to us



that leaves one, maybe two good reasons to go with the Transformer Book: you want the spare 500GB hard drive, or you like the idea of having a spare battery. Otherwise, there are other form factors that accomplish the same thing as the Transformer Book, albeit with a greater emphasis on the laptop piece.

Moving on with our tour, that fan sits on the back edge of the tablet, right below the 5-megapixel / 1080p rear camera. (No LED flash, sorry.) Around back, you'll also find dual speakers, with one grille on each end. Holding the tablet in landscape mode, you've got the volume rocker on the left side, along with a micro-HDMI socket and a headphone jack. Over on the right, there's an exposed microSD slot. On the bottom, obviously, are all the docking connectors that latch into the keyboard.

There's also a proprietary charging port down there, which you'll find mirrored on the dock as well. Naturally, a common connector means you can use the same cable to charge both devices, and at the same time, even. Finally, the power / lock button is on top, just where you'd expect it to be. Interestingly, you don't have to hold it down to turn the device on, as you would with a real tablet; this really is more of a laptop without a keyboard.

That about covers everything you might need in tablet mode. The dock, meanwhile, is home to (almost) all the ports you could possibly want in a laptop (and yes, that includes an Eth-

ernet jack). In addition to that wired connection, there's a full-size SD card reader, two USB ports, mini-VGA and a DisplayPort. The only thing missing is HDMI, but fortunately there's a world full of adapters you can buy if a simple TV hookup is what you're after.

Finally, you'll probably be interested to know what comes in the box. For starters, you get a simple black carrying case, along with two dongles: USB-to-Ethernet and mini-VGA-to-VGA. ASUS has been throwing in these sorts of extras for years, as any loyal customer will tell you, and we're glad the company is keeping it up.

KEYBOARD DOCK AND TRACKPAD

If you've owned or even played with a Zenbook Prime before, you know what to expect with the Transformer Book: it has basically the same backlit keys as ASUS' earlier offerings (everything after the original UX31, anyway). For some time now, these keyboards have had plastic, not metal, buttons, with a good deal more travel than they used to. In fact, the company slightly adjusted the key travel this time around, making that the only change over previous models.

Whether ASUS made the buttons deeper or shallower is hard to tell: they feel about the same. All we know is that the keyboard offers more tactile feedback than most ultraportables, and that the buttons are bouncy and well-spaced enough that typos are unlikely (we're sure you can find a way, though). Seri-





ASUS has maintained the keyboard quality we expect.

ously, when we think back to ASUS' first Ultrabook, where we had to mash the keys to make sure our presses registered, we're reminded of how far the company has come, at least in terms of typing experience. Today, ASUS' keyboards don't call much attention to themselves. And that's a good thing.

Lingering on the keys for a moment, you'll find a few functions built into specific buttons. The space bar, for instance, has a control on the left end that activates the Power4Gear Hybrid application, where you can select different power management profiles. The "C" key doubles as a shortcut for ASUS' Splendid Video Technology dashboard,

where you change the display settings to "Theater," "Vivid" or some manual configuration. (We left it on the default mode most of the time, because we're boring like that.) The "A" button contains an on / off switch for the ambient light sensor. The "V" key, meanwhile, is where you'll find a shortcut for ASUS' Lifeframe camera app, which has all the photo filters, borders and emoticons you'd expect from a typical notebook webcam. The Function keys, of course, house all your requisite volume and brightness controls. In this case, you need to use the Fn key to activate them; that's either good news or bad news, depending on how much you rely on keyboard shortcuts.





The trackpad performance is accurate and mostly trouble-free.

ASUS has come a long way with its trackpads too. The one here, which uses ASUS' own drivers, isn't half-bad. We enjoyed smooth, controlled pinch-to-zooming in IE10, and didn't even have to apply much pressure with our fingers. Two-finger scrolls work well too. Even single-finger tracking is precise, which might be the number one thing we complain about when we test out laptop touchpads. If anything, the touch button is a bit stiff, but that's easy to let slide compared to some of the other issues we're used to.

DISPLAY AND SOUND

ASUS was one of the first companies to offer 1080p on an Ultrabook, and it was also one of the first to release a tablet with a 1,920 x 1,200 screen. So it should come as no surprise that the company went all out on its flagship Transformer Book. What we have

here is a 13.3-inch IPS panel with a 1,920 x 1,080 resolution, a 72 percent color gamut and a brightness rating of 350 nits — about as bright as laptops get. Compared to some other touchscreen devices, like Toshiba's new Kirabook, the bezels are fairly wide, though the

glass, at least, runs nearly edge to edge. (All touchscreens have at least *some* sort of bumper along the sides.)

Those bezels aside, it's of typical ASUS quality, which is to say the colors are vivid and the viewing angles are wide, especially from the front with the lid pushed forward. Though the glossy finish tends to reflect light (as glossy finishes do), we were impressed by how the colors stayed vibrant even as we shifted our position to watch from off-kilter angles. Sure, all of that starts to fall apart as you move toward a 180-degree angle, but how many of you really watch Netflix out of your peripheral vision anyway?

As it's been doing with its other Ultrabooks, ASUS went with a Bang & Olufsen ICEpower audio setup, with four speakers and MaxxAudio technology on the software side. So, the equation hasn't changed, and neither has our opinion: the machine pulls off some surprisingly





The screen resolution is a crisp and pleasing 1,920 x 1,080.

not-tinny sound (relatively speaking) but the volume is low, even for a small laptop. We enjoyed listening to everything from The Clash to Ray Charles, but time and again, we kept hitting the volume-up button, only to be reminded we were already maxed out.

PERFORMANCE AND BATTERY LIFE

The Transformer Book runs off a 1.9GHz Core i7-3517U processor, the same one used in various Ultrabooks that went on sale last fall, like the Acer Aspire S7 and ASUS' own TAICHI 21. Additionally, it has 4GB of RAM, a 128GB SanDisk SSD and, of course, integrated Intel HD 4000 graphics. (What? You weren't expecting a discrete GPU, were you?) For whatever reason, its synthetic benchmark scores trail what we got from similarly specced machines (discounting the S7, even, because that has a faster RAID 0 setup). That said, we refuse to believe it's a slow machine, per se. In practical terms, it boots in six seconds,

WINDOWS 8 SYSTEMS	BATTERY LIFE
ASUS TRANSFORMER BOOK	5:01 (TABLET ONLY)
ACER ICONIA W700	7:13
SAMSUNG SERIES 9 (13-INCH, 2012)	7:02
MACBOOK AIR (13-INCH, 2012)	6:34 (OS X) / 4:28 (WINDOWS)
DELL XPS 14	6:18
SONY VAIO T13	5:39
LENOVO IDEAPAD YOGA 13	5:32
DELL XPS 12	5:30
SAMSUNG SERIES 5 ULTRATOUCH	5:23
ASUS ZENBOOK PRIME UX31A TOUCH	5:15
ASUS ZENBOOK PRIME UX51VZ	5:15
TOSHIBA SATELLITE U845W	5:13
TOSHIBA KIRABOOK	5:12
TOSHIBA SATELLITE U845	5:12
ACER ASPIRE TIMELINE ULTRA M3	5:11
TOSHIBA SATELLITE U925T	5:10
LENOVO THINKPAD X1 CARBON	5:07
ACER ASPIRE TIMELINE ULTRA M5	5:05
LENOVO THINKPAD X1 CARBON TOUCH	5:00
SONY VAIO DUO 11	4:47
ACER ASPIRE S5	4:35
MSI SLIDEBOOK S20	4:34



which might be the fastest start-up time we've logged yet on a Windows 8 device. Also, it resumes from sleep in under two, as advertised. What we're trying to say is: calling this a slow system would be a huge misnomer.

If you're thinking it's the 500GB HDD dragging down the performance scores, rest assured that's not the case. First off, we got the same sort of num-

bers even when we ran our tests with the keyboard detached. Secondly, ASUS says the OS is installed on the 128GB solid-state drive and that the computer stores files there first by default, unless you tell it to do otherwise. In other words, you won't even start using it until you run out of space on the SSD. Really, then, it helps to think of the keyboard dock as a giant external hard

BENCHMARK	PCMARK7	3DMARK06	3DMARK11	ATTO (TOP DISK SPEEDS)
ASUS TRANSFORMER BOOK (1.9GHZ CORE i7-3517U, INTEL HD 4000)	4,414	3,840	E924 / P512 / X177	482 MB/S (READS); 317 MB/S (WRITES)
TOSHIBA KIRABOOK (2.0GHZ CORE i7-3537U, INTEL HD 4000)	5,275	5,272	N/A	553 MB/S (READS); 500 MB/S (WRITES)
ACER ASPIRE S7 (1.9GHZ CORE i7-3517U, INTEL HD 4000)	5,011	4,918	E1035 / P620 / X208	934 MB/S (READS); 686 MB/S (WRITES)
MSI SLIDEBOOK S20 (1.8GHZ CORE i5-3337U, INTEL HD 4000)	4,043	3,944	E1,053 / P578	484 MB/S (READS); 286 MB/S (WRITES)
ASUS TAICHI 21 (1.9GHZ CORE i7-3517U, INTEL HD 4000)	4,998	4,818	E1,137 / P610 / X201	516 MB/S (READS); 431 MB/S (WRITES)
MICROSOFT SURFACE PRO (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,673	3,811	E1,019 / P552	526 MB/S (READS); 201 MB/S (WRITES)
LENOVO IDEAPAD YOGA 13 (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,422	4,415	E917 / P572	278 MB/S (READS); 263 MB/S (WRITES)
ACER ICONIA W700 (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,580	3,548	E518 / P506	542 MB/S (READS); 524 MB/S (WRITES)
DELL XPS 12 (1.7GHZ CORE i5-3317U, INTEL HD 4000)	4,673	4,520	N/A	516 MB/S (READS); 263 MB/S (WRITES)



drive; when you attach it, you even get the same Windows dialog box that you would if you inserted a thumb drive.

ASUS wasn't kidding when it said the tablet's 5,000mAh battery could last five hours: our test unit ran exactly five hours and one minute in our rundown test (video looping, WiFi on). If you look at the comparison table, you'll see that's about average for a touchscreen Ultrabook with an Ivy Bridge CPU — the new Kirabook and the ASUS Zenbook Prime UX31A Touch both delivered pretty similar results. The best you could hope for on a device like this is maybe half an hour longer, but hopefully that'll change when Haswell becomes the new chip standard. For now, as we said, the keyboard dock has its own 3,120mAh battery, which promises to extend the runtime to up to eight hours.

SOFTWARE AND WARRANTY

We have to say: we're digging this trend of PC makers putting less crapware on their systems. (None would be super, but we'll take what we can get.) On board, you'll find World Clock, Fresh

In the event anything breaks, you've got one year of warranty coverage. Pretty standard for consumer PCs.

Paint, *Microsoft Solitaire Collection*, ASUS Tutor and a few Xbox Live games, including *Taptiles*, *Adera* and *Pinball FX*. There's also that Power4Gear Hybrid power management software we mentioned earlier in the review. Oh, and you get 32GB of ASUS WebStorage, free for three years. After that time expires, you still get eight gigs free for life.

In the event anything breaks, you've got one year of warranty coverage. Pretty standard for consumer PCs

CONFIGURATION OPTIONS

When ASUS first announced the Transformer Book line a year ago, we were under the impression it would be available in 11-, 13- and 14-inch screen sizes. Evidently, someone high up in the pecking order decided that would be a bad idea, as the company is now selling just the 13-inch model, and in one configuration at that. In the US, you'll be able to get precisely the unit we reviewed today, a \$1,499 machine with a Core i7 processor, 4GB of RAM and a 128GB SSD inside the tablet. Outside the US, a Core i5 version will be available in some regions. That one will have a 320GB HDD inside the keyboard dock, not a 500GB drive.

THE COMPETITION

It's getting a little tiresome ending all pre-Computex laptop reviews this way, but it's worth repeating nonetheless: unless your laptop dies a sudden death leaving you without a computer, you should wait until Intel launches its next-gen Haswell





Boot time
is under six
seconds and
it wakes in
under two.

chips before making a purchase. We don't know everything there is to know about those processors yet, but we have been promised longer battery life and improved graphics performance which — hello? — is exactly what Ultrabooks need right now. Those are two very good reasons to wait, even if you're not particularly interested in clock speed, cores or Turbo Boost. And besides, all of our current favorite Win 8 devices (the Dell XPS 12, the Lenovo Yoga 13, the Acer Iconia W700, etc.) are due for refreshes themselves, if not out-and-out redesigns. So sit back and see what's announced in Taiwan next month.

If you'll allow us to talk up a couple true competitors, though, we'd encourage you to read up on HP's Split x2 hybrid, which

arrives in August with a 13-inch display and a keyboard dock that includes both a spare battery and a 500GB hard drive. Unfortunately, this, too, will ship with Ivy Bridge processors, and its specs aren't a total match anyway (it'll have Core i3 and i5, with a lower-res 1,366 x 768 display). Still, with a starting price of \$800 (dock included) it could be tempting for those who don't want to spend \$1,499 on the Transformer Book. Finally, there's also the Lenovo ThinkPad Helix, an 11.6-inch machine with similar internals. Unfortunately, we haven't gotten a chance to review it yet, but here's hoping we rectify that soon.

WRAP-UP

If you were willing to wait this long for the Transformer Book to go on sale, you



may as well wait a few more months for a possible Haswell refresh: it would bring longer battery life and stronger graphics performance too. But is it worth holding out for at all? Depends on how badly you want a 13-inch standalone tablet. Though the dockable-tablet form factor makes sense for 11-inch systems, it becomes more niche-y when you expand the screen size to 13 inches. After all, tablets that big can be cumbersome to use, even when they're as thin and relatively light as the Transformer Book is. And this one doesn't have a Wacom digitizer, which rules out some scenarios where the slate form factor might come in handy. Meanwhile, convertible laptops like the Lenovo IdeaPad Yoga 13 and Dell XPS 12 weigh less in total, but still manage to offer roomy keyboards, hands-free tablet modes, slightly longer battery life and similarly fast (or faster) performance.

Before you dismiss it, though, there are still some practical reasons to choose the Transformer Book over those other machines. Number one is that spare battery. No convertible Ultrabook allows you to use two batteries at once. None. And unfortunately, many current hybrids (the Surface, Acer Iconia W700) don't have a second battery in the keyboard. Likewise, it's extremely uncommon to find a spare hard drive inside the keyboard dock, and most Ultrabooks tend to top out at 256GB of solid-state storage. So if more space and extended battery life are important, the Transformer Book could be a good option — even if you rarely end up using it as a tablet. Just take our advice and wait on Haswell. **D**

Dana Wollman is Reviews Editor at Engadget, a marathoner, lover of puns and a native Brooklynite.

BOTTOMLINE

**ASUS
TRANSFORMER
BOOK TX300****\$1,499****PROS**

- Lovely 1080p IPS display
- Comfortable keyboard
- Fast boot-up, resume times
- Keyboard dock has a spare battery, hard drive

CONS

- Heavy for a 13-inch touchscreen Ultrabook
- Launching with a year-old CPU

BOTTOMLINE

The Transformer Book was an innovative concept when it was first announced a year ago. But now that it's finally shipping with old components, you're better off waiting for a possible Haswell refresh.



DISTRO
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REVIEW

ASUS PADPHONE INFINITY



The new **PadFone Infinity** tops its predecessors and challenges the competition, but are consumers sold on the dual form factor?
By Richard Lai

Almost exactly two years ago, Motorola's Android-in-Webtop-OS solution was kicked off the stage by ASUS' PadFone, the world's first phone that could fully power a tablet module from its own OS. The original concept took a while to materialize, but since then the company has kept up with a surprisingly rapid product cycle. It was only five months from the first PadFone to the PadFone 2; and now seven months later, ASUS is offering the PadFone Infinity: a non-surprising full HD update for both the phone and the tablet module. The phone itself



also benefits from a newer 1.7GHz quad-core Snapdragon 600 SoC, as well as a new brushed-aluminum body. So, does this upgraded package have what it takes to kill the “glass is half empty” mentality? Or would consumers still rather have two separate devices? Read on to find out.

HARDWARE

Let's start off with the phone. Like many of the latest Android flagships, the PadFone Infinity comes with a 5-inch, 1080p display and a quad-core chip. In terms of resolution, viewing angle and color gamut, the newer screen is a significant upgrade from the predecessor's 4.7-inch, 720p panel; though the screens from both generations belong to Sharp's LTPS line (not to be confused with the newer IGZO line, which is currently less efficient at this panel size). Unsurprisingly, the Infinity comes with a bigger built-in battery — 2,400mAh, which is a nice bump from the old 2,140mAh cell. The main camera uses the same Sony 13-megapixel IMX091 sensor as the PadFone 2, but its lens has been upgraded from f/2.4 to a brighter f/2.0. On the other side of the phone, the old

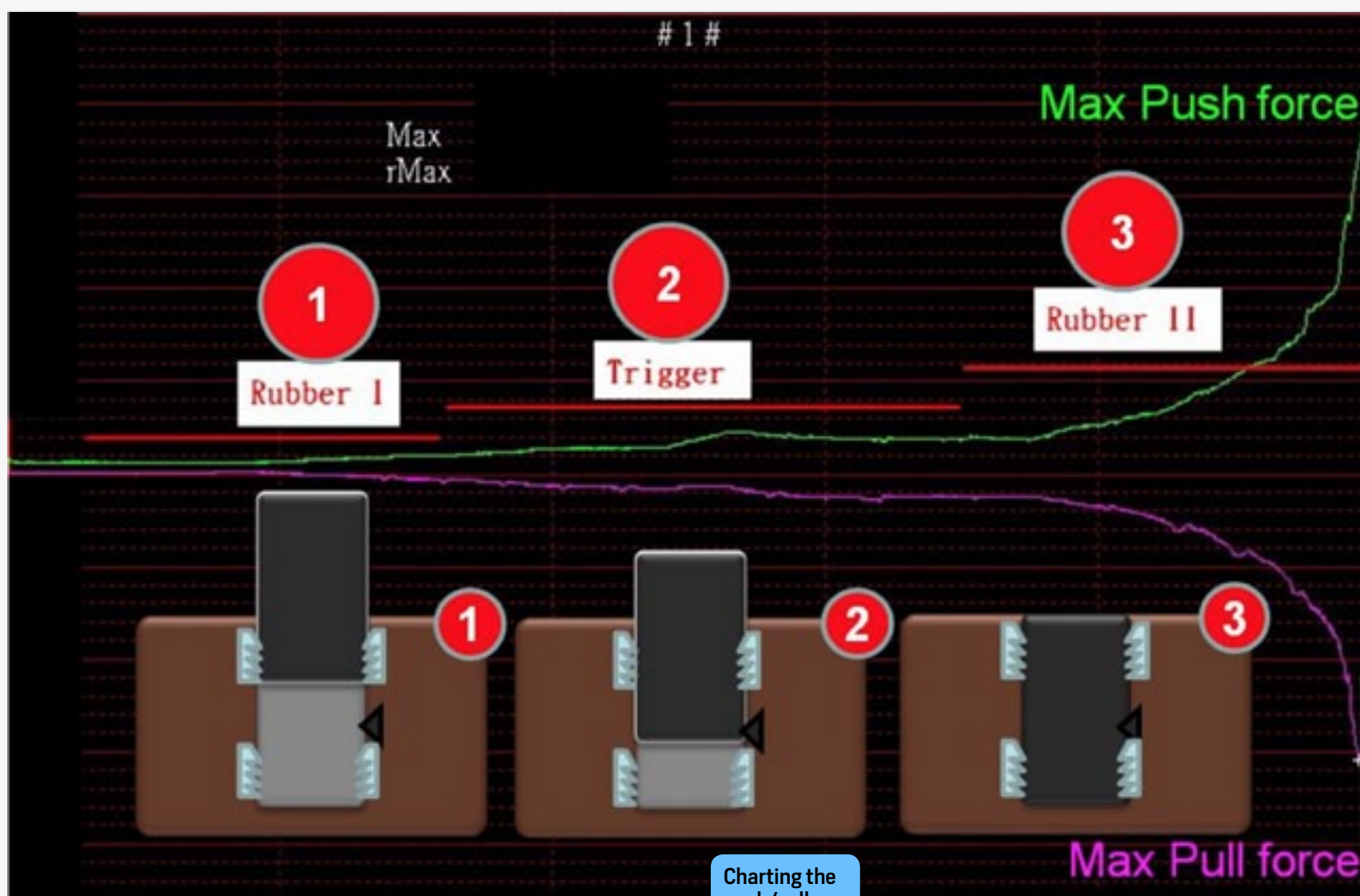
The back side alone easily makes this one of the best-looking devices ASUS has ever created.

1.2-megapixel front-facing camera has been replaced by a 2-megapixel, f/2.0 module (it's an OmniVision OV2722 sensor, if you care), but the backlit capacitive soft keys below the screen are here to stay.

The Infinity utilizes a brand-new design that takes advantage of an aerospace-grade, twice-anodized aluminum alloy construction. Instead of the signature Zen-ripple etching on the old polycarbonate cover, the almost fully metallic Infinity features a vertical brush pattern across its back — one that is ever so slightly

The Infinity has a 5-inch handset and a 10.1-inch tablet / dock.





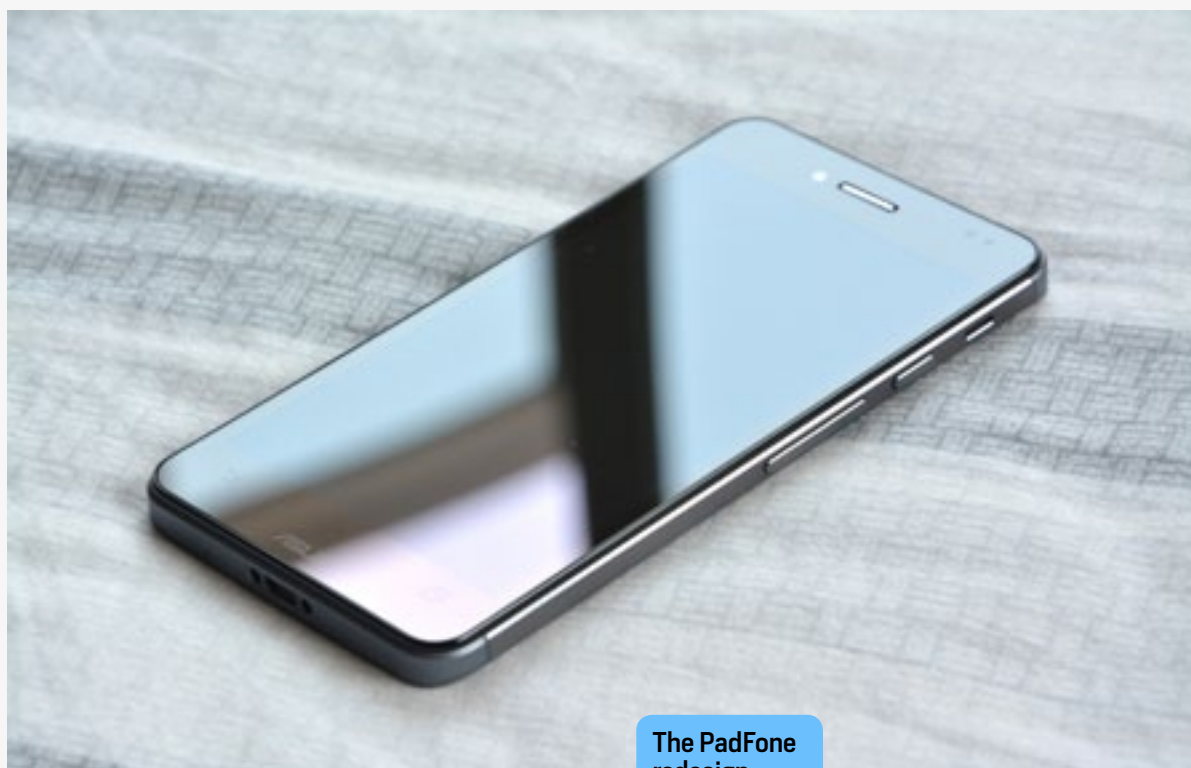
curved when viewed from either the top or bottom, making the thickness vary from 8.9mm in the middle to about 6mm at the edges.

While the back's gentle curve does make for a somewhat comfortable grip, it stops dead at the straight sides and therefore produces relatively sharp edges. The two previous PadFones, on the other hand, had well-rounded corners that fit our hands better. It would have also helped if the screen bezels were less than 4mm thick, thus keeping the phone narrower. However, these are trade-offs that we're willing to accept for the sake of the Infinity's versatility, solid feel and clean look. How clean? The back is dominated by the

straight brushed-metal pattern, though there are a few features garnishing it as well. Near the top you'll find the usual camera and its LED light, then at the bottom there's the "PadFone" logo above a T-shaped NFC antenna band — a feature seen on some metallic phones like the Xperia Ion, Xperia P and the HTC One. The back side alone easily makes this one of the best-looking devices ASUS has ever created. As for the front, the protruding, scratch-resistant Corning screen lens covers almost the entire surface, leaving a shiny 1mm-wide chamfer from each side of the metallic body to reduce the chance of shattering when dropped.

The phone's four sides feature a





The PadFone redesign leaves it with rather sharp edges to grip.

matte finish in the same color as the back — either “titanium gray,” “hot pink” or “champagne gold” (color availability may vary across regions). Interestingly, the loudspeaker’s now located on the right side just above the power button and volume rocker, so it’s less likely to be blocked in various scenarios. On the other side of the phone you’ll only find a pin-ejection tray for a nano-SIM card, which makes the Infinity the first non-Apple device to adopt the new standard (the fake iDevices don’t deserve recognition here, obviously).

The top and bottom sides actually consist of well-disguised polycarbonate, which enables better reception through what’s otherwise an all-metal body. The top edge is occupied only by a 3.5mm headphone jack, whereas the bottom side houses the microphone and a micro-USB socket. Unlike the PadFone 2, which had a 13-pin MHL connector,

the Infinity’s micro-USB port integrates the MyDP (Mobility DisplayPort) interface for twice the performance of MHL (at 5.4Gbps, which allows 1080p60 playback). It also provides a snug fit with any ordinary micro-USB plug — something that the PadFone 2 failed at.

Finally, sandwiching the micro-USB port are two round sockets for the tablet module’s external antenna, catering to cellular signal (worldwide model: WCDMA 900 / 2100 with DC-HSPA+, and LTE 800 / 1800 / 2100 / 2600) as well as Bluetooth 4.0 and 802.11a/ac/b/g/n.

What you won’t find on the Infinity is a slot for microSD expansion, so you’ll have to choose carefully between the 32GB and 64GB models. But as with the PadFone 2, ASUS offers 50GB of cloud storage, free for two years. Plus, there’s always the handy, but less elegant USB OTG for storage expansion via flash drives.

In principle, the hardware here is more similar to the PadFone 2 than the original PadFone: the phone docks vertically into an exposed bay on the back of a 10.1-inch tablet module aka the PadFone Station. And unlike the first PadFone, there’s still no docking key-



board with a built-in battery, so you can't use the Infinity like a laptop. Regarding the latest model, specifically, ASUS Corporate Vice President Benson Lin doesn't think the laptop form factor is a feature that would help his company ship 1 million phones this year. In his defense, ASUS does need to keep the combined weight of the phone and tablet module to a minimum — at least not much more than that of the iPad with Retina display for the sake of competitiveness.

At this point, this is only achievable by shaving off as much weight as possible on the PadFone Station, hence the lack of a docking socket and circuitry for a docking keyboard this time around. Of course, this isn't a flaw, per se, but the lesser package may struggle to convince folks who were sold on the original PadFone concept. On the other hand, the simpler and lighter package could help win more users, anyway. Compared to the 4G iPad, which weighs in at 662g, the PadFone Infinity's combined weight of 677g (145g plus 532g) is still very competitive, and it's not that far off from the PadFone 2's 649g. For those who do miss the laptop form factor from the original PadFone, there's always

the Folder case or TranSleeve case, which lets you prop up the PadFone Station and then hook up the device with a Bluetooth keyboard. You can also connect a USB keyboard via an optional adapter.

The new PadFone Station comes with the same 5,000mAh battery (made by Sanyo) as its similar-looking predecessor, meaning it can, theoretically, charge up the docked phone twice in battery pack mode; or you can keep the phone juiced up — either matching the module's battery level or prioritized, depending on your setting — while using it as a tablet. Now, since this new PadFone Station comes with a more demanding 1,920 x 1,200 IPS panel (from Panasonic), the battery shouldn't last as long as it did with the previous 1,280 x 800 screen; but the quality upgrade is well worth the small sacrifice. Plus, there are mechanisms on the soft-

The handset sports a vertically brushed metal back.



ware side to optimize battery life.

As before, you'll also find a nice loudspeaker, a microphone and a micro-USB port on the PadFone Station, but they've all been relocated. The loudspeaker, powered by an 18mm driver, has effectively swapped places with the microphone, so that it's now behind your right hand and well away from the tablet's volume rocker and power button on the left. As for the micro-USB port, it's been moved from the bottom edge to the right side, which means you can finally plug a USB peripheral into the tablet while it's propped up by its case. The same old 1-megapixel front-facing camera (with Azureware's sensor) is at its usual spot — in the middle of the screen bezel's top edge, but it's no match for its 2-megapixel counterpart on the phone.

Like the PadFone 2, the Infinity's PadFone Station uses a docking-retention system involving four serrated silicone rubber grips, which hold onto the two vertical sides of the phone. In a nutshell, this cunning design keeps the phone securely docked even when shaken upside down, while also allowing the user to pull the phone out with a gentle grip. This is best illustrated by the graph (courtesy of ASUS), which shows how the required push and pull forces are carefully calibrated across different phases during docking. However, we couldn't help but notice a light rattle when we gently shook our docked Infinity module. Not that we've managed to shake the Infinity out of the tablet (se-

riously, we actually tried really hard), but we definitely never encountered such a nuisance with the PadFone 2.

We brought the offending mass-production devices to ASUS' office and tried our phone with another PadFone Station. The result? A lighter rattle this time, but finally we came across an engineering sample module that kept the phone very still, ironically enough. Upon close inspection, it appears that this sample's docking bay had a slightly thicker padding than our two previous modules. There's clearly a problem with the consistency of build quality, but if anything, the light rattle would only be slightly annoying to some, rather than having the potential to cause any damage.

Other than that one niggle, we had no problem holding the PadFone Station in either portrait or landscape. While the majority of the tablet module is 10.6mm thick (the thickest point being about 15 to 16mm thick over the docking bay), the tapered edges on the left, right and bottom sides give a nice fit in our hands. The matte, but smooth, rubbery finish certainly helps, too. The PadFone Station also comes in one of three colors to match the phone, but you're welcome to slip a pink handset into a gold tablet if that's how you swing.

SOFTWARE

We've always been fans of ASUS' approach to customizing Android. Which is to say, it mostly sticks to the stock OS. This is surely one of the reasons it of-



The lack of heavy skinning helps keep the system running like butter.

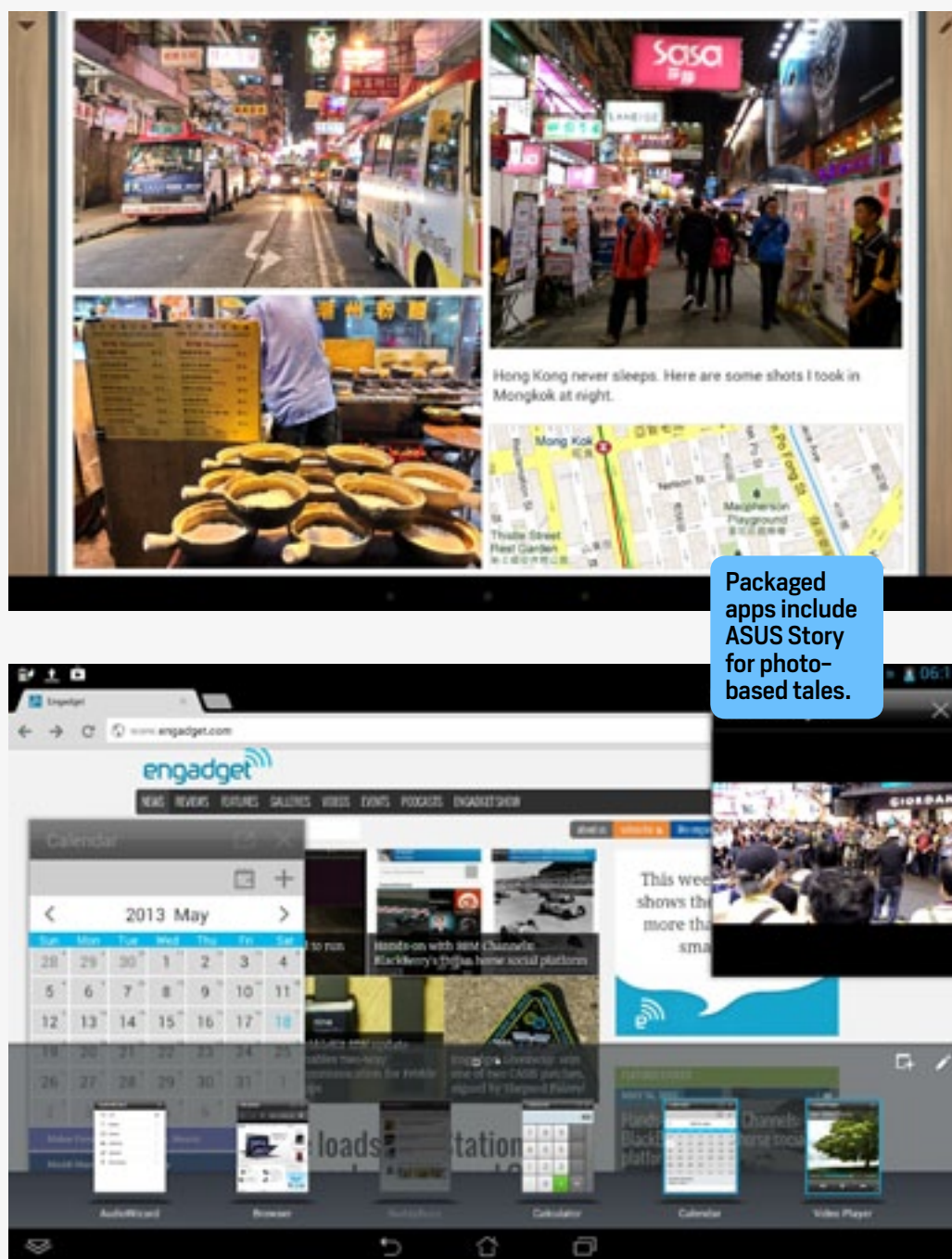
ten beats the competition to rolling out major updates, not to mention offering regular fixes. And of course, the lack of heavy skinning also helps keep the system running like butter. In the case of the PadFone Infinity, we've already received three OTA updates over the last two weeks (taking us to build 10.6.8.10 based on Android 4.1.2; not Android 4.2

as promised at launch), which is pretty typical of a freshly launched ASUS mobile device. Such a rapid rate is of course highly commended.

The fact that ASUS continues to use near-vanilla Android is by no means an indication that the company's been cutting corners. In fact, it's quite the opposite. First of all there's the classic ASUS Quick Settings feature that adds a row of customizable quick toggles (for auto-rotate screen, WiFi, WiFi hotspot, Bluetooth and more) and a screen brightness slider to the pull-down notification tray, and this is consistent across both

ASUS keeps the skinning of Android to a pleasant minimum.





frequency or download time. Not sure what took this so long (or why vanilla Android never had this in the first place), but we're glad it's here now.

Another stealthy tweak lies in the home button: when you long-press it, rather than showing just the Google Now button, the Infinity gives you two rows of shortcuts. The outer arc hosts up to eight customizable app shortcuts, meaning you can jump to any of these apps from anywhere at any time. The inner arc, meanwhile, gives you buttons for ASUS Echo (for voice command), Google Now, device lock, app tray and settings (for selecting the outer arc's shortcuts). We have mixed feelings about this one,

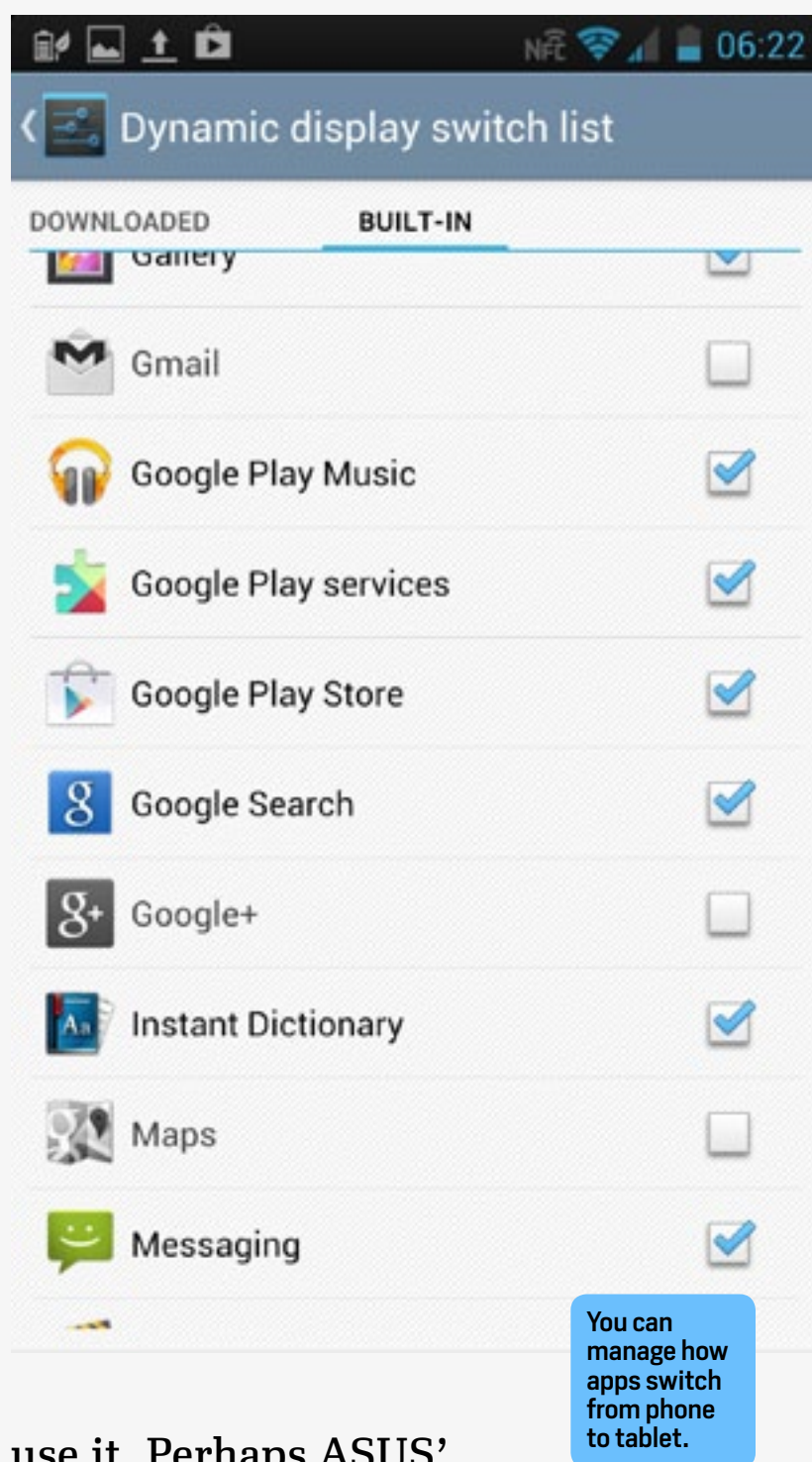
phone mode and tablet mode. Given that you can disable ASUS Quick Settings, we're certain that you'll be able to switch to Android's native quick settings tray when the eventual 4.2 update comes along. Still, we're quite content with ASUS' implementation.

ASUS has also made subtle changes in a few other areas. For one, the "Pad only" tab in the tablet mode's app tray is still there, where users can filter out pad-only apps for quicker access. There's also a small drop-down menu in the app tray for sorting apps by name,

as we've gotten used to flicking our finger from the home button to the lone Google Now shortcut on many other phones; so it'd be nice if there were a way to disable this feature. That said, maybe this will come in handy once you get used to it.

Moving to a higher level in the UI, ASUS has decided to throw in the ability to change the home screen scenarios. Yes, it's basically like "Scenes" in the older versions of HTC's Sense UI, but HTC has ditched it in Sense 5, with the reason being not many people actually





use it. Perhaps ASUS' more intuitive implementation will popularize this feature once again: you toggle the scenario-selection mode by simply pinching the home screen. Then you can either edit your home screens or switch to another scenario from there. Out of the box, the Infinity has already set up a "Work" scenario filled with productivity widgets, as well as an "Entertainment" scenario featuring shortcuts for multimedia apps and a couple of social networking apps by ASUS. You can, of

course, create your own scenario from scratch as well.

The killer feature of the PadFone series is obviously Dynamic Display, a fancy name given to the way the current app is kept alive when switching between phone mode and tablet mode. The good news is that not only did ASUS keep the switch time below two seconds, but also the list of compatible apps out of the box has grown tremendously, including many of the 23 ASUS apps we'll talk about in just a moment. As before, essential apps like Calendar, Camera, Contacts, Gallery and Messaging can still seamlessly switch between the two interface modes. In other words, you can show off how a video clip keeps playing on the bigger screen once you've docked the phone, or how the calendar switches from phone mode to tablet mode, as opposed to just scaling up to fit the larger screen.

Annoyingly, flagship Google apps like Gmail, Google+, Maps, Hangouts and YouTube are grayed out on the Dynamic Display list, as they are still not compatible with one of the main selling points on the PadFone series. Those that do work well include Chrome, Drive, Play Music, Play Store, Search and Translate, but they require manual enabling in settings for some reason. As for the non-bundled or non-Google apps, your mileage may vary: we had almost no problem with our own Engadget app, nor Dropbox, Facebook, Foursquare, IMDb, MX Player or



SoundHound. Still, we found glitches in Amazon Kindle, Evernote, Firefox and Twitter — usually in the form of weird font sizes or displaced UI components.

Now, going back to the ASUS apps. If you've already played with ASUS' previous Android devices, then you should already be familiar with most of them. These include ASUS Studio for viewing photos (by location, face or tags); MyLibrary for e-books; AudioWizard for boosting the loudspeakers or headphones (the latter part is new, but not as well-tuned, suffering from volume fluctuation); MyBitCast (a note-taking app that supports audio recording); SuperNote; Watch Calendar (a calendar displayed in the style of a clock); and WebStorage. The old Instant Dictionary widget is also here and can be toggled through the quick settings in the notification tray, after which you can hit the round floating widget to highlight any text for instant lookup.

Of the new bundled apps, the notable ones include ASUS' Splendid onscreen color tool, as seen on ASUS computers, as well as ASUS Echo, ASUS Story, Birthday Reminder and ASUS To-Do. We're particularly fond of ASUS Story, which lets you create photo stories in neat collages — great for presenting your family photos or just for killing time. ASUS Echo, on the other hand, failed to impress. While the company made a big deal out of this voice-command app at MWC, it sometimes wouldn't even respond to the

scripted commands for making phone calls. Even if that worked, we were hoping for a natural conversation experience that we're used to with Apple's Siri, but Echo is nowhere near that level of sophistication.

ASUS has also come up with a couple of social networking-related apps: BuddyBuzz and PinPal. The former aggregates news from your various networks — Facebook, Plurk, Renren (China's take on Facebook), Twitter and Sina Weibo — and presents the feed in a magazine-like interface. PinPal, on the other hand, focuses on your selected friends' Facebook and Twitter feeds, and it displays their posts in a bland, but cleaner style for some creepy stalking. While we prefer BuddyBuzz to PinPal, both apps have crashed many times on us, with the former also suffering from poor photo rendering as well as struggling to grab images from Weibo, while the latter can get a bit laggy when it manages to stay running. Until ASUS sorts these apps out, we recommend staying away to minimize your agony.

On a brighter note, some of these ASUS apps also come in the form of floating widgets in tablet mode — much like the ones you get on Samsung tablets. To toggle these, simply hit the arrow at the bottom-left corner of the screen, and then you'll be shown a selection of 10 resizable floating widgets: AudioWizard, Browser, BuddyBuzz, Calculator, Calendar, Video Player, Countdown, Stopwatch, Dictionary and



Email. If that's not enough, you can also add some of the normal widgets to the list, but you won't be able to resize them. Our only issue with the default floating widgets is that they respond slowly when we resize them, but chances are this is something that ASUS can also fix via an update.

CAMERA

As mentioned before, the PadFone Infinity shares the same 13-megapixel image sensor as the PadFone 2, except this newer device comes with a brighter f/2.0 lens. Add in the fact that ASUS has had more time to optimize the sensor's firmware, and it's no surprise that we're seeing better results this time around. In our PadFone 2 review, we complained about the severe loss of detail in night shots due to the high noise-suppression rate, so we're happy to say this is less of an issue on the Infinity. (And for the record, the PadFone 2's also received a fix for the aforementioned issue since our review.)

In comparison shots against the HTC One, distant billboards maintained a fair amount of detail in the Infinity's photos, though the One still edges out with better color accuracy, presumably

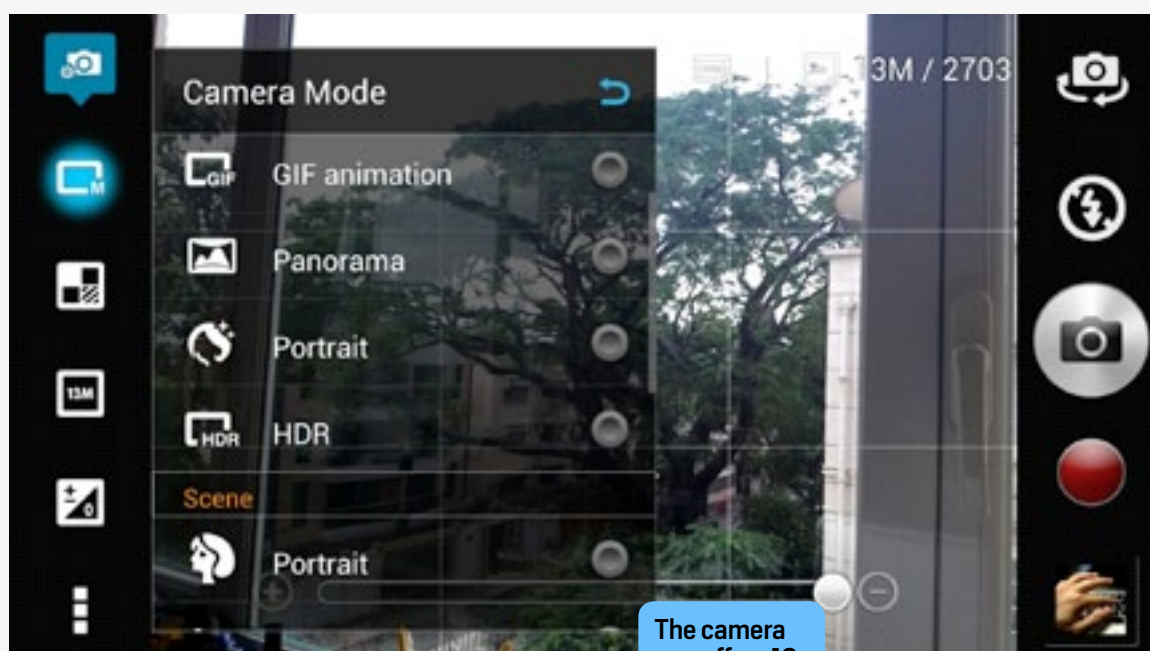
due to its larger pixels. As for HDR, we much prefer the results on the Infinity at night, but we did find ourselves too often relying on said feature, as the contrast of the images would otherwise be too strong (this can also be fixed in post by adjusting the gamma using a photo editor). Daytime performance is quite good in general, faithfully reproducing even the fluorescent range of colors. However, we regularly had to manually increase the exposure when trying to capture subjects under the bright sky.

Little has changed with the camera app since we reviewed the PadFone 2. With the volume keys facing upward in landscape mode, the app's intuitive layout gives you dedicated buttons for taking stills and recording video on the right (you can also capture full-resolution stills during filming). Meanwhile, the left column is occupied by various settings: modes, resolution, effects and exposure. The top-left button lets you toggle between still camera and video camera settings, without locking you down to either still mode or video mode — a problem that many other camera apps suffer from.

While you can use either the virtual button or one of the two volume keys to trigger the camera, the Infinity also comes with a new voice-activated shutter that responds to "shoot," "cheese" or "one, two, three," and you can activate this mode in the settings menu at the bottom-left corner of the camera app.

It's no surprise that we're seeing better results this time around.





The only real caveat while taking photos or videos is that when using the Infinity in tablet mode, you need to make a mental note of the phone's actual orientation. Put simply: if you want to take a landscape photo or video (as you should), you need to hold the tablet in portrait mode.

Like most flagship phones these days, the Infinity's camera is listed with

zero shutter lag, but we noticed that this is disabled out of the box. We soon found out why: once enabled, the virtual viewfinder started to stutter, presumably due to the extra resources taken up by the sensor and its ISP. Regardless, you can enable burst mode, which supports continuous shots at up to 8 fps — up from 6 fps with the PadFone 2 — for up to 100 shots in the full 13-megapixel resolution. This also works with all 10 filters offered by the camera app, with our favorite one being the “Dropper” that lets you remove certain colors in the live feed.

There are eight scenes available for the

still camera: portrait, landscape, night, snow, sunset, party, backlight and vivid. These are usable in all of the camera modes, including the aforementioned HDR mode, portrait mode (formerly “beautification mode,” for eye enlargement, cheek blushing, face slimming and removing skin shine), panorama mode and a new GIF animation mode. Making a GIF image is very much the same as



shooting a 30-frame burst, with a choice of 0.8 megapixels, 0.3 megapixels or 0.1 megapixels in 4:3, or one megapixel in widescreen ratio. The files do get quite large very quickly so the lower resolutions are recommended.

The video camera mode is very much the same as before. On top of the usual set of resolution options, you can also pick one of the following high-frame-rate modes for slicker playback: 1080p locked at 30 fps, 720p varying between 20 fps and 60 fps, and 480p varying between 20 fps and 90 fps. Alas, the varying frame rate is to compensate for the shooting environment's brightness, so don't be alarmed if your nighttime clips come out just as choppy as those taken in the normal mode. While we're on the subject, ASUS has also added a slow-motion mode (muted) in either 720p or 480p, though there's no way to control how much you slow down, as there is on the Xiaomi Phone 2.

As on the PadFone 2, the video camera mode has the same set of filters as the still camera mode. Similarly, there's also a set of silly face effects that do funny things with one's face, eyes, mouth or nose, though these are limited to 480p, which should be adequate for a quick laugh. Going back to normal video mode, there's not much to complain about with the picture quality, but we did notice that the first second of audio always gets chopped off, followed by a sudden drop in noise at about three seconds into each clip

— presumably to do with the phone's active noise cancellation. Again, we're certain that both of these can be fixed via an update.

PERFORMANCE AND BATTERY LIFE

With Qualcomm's Snapdragon 600 SoC and 2GB RAM turning up on almost every flagship Android device these days, there's no need for us to do a long presentation on how powerful this chip is in terms of number crunching and graphics rendering. Apart from the incompatibility issues we hit with certain apps over Dynamic Display, we've experienced virtually no lag in day-to-day operation. Additionally, heavy games like *Need For Speed: Most Wanted* and *The Dark Knight Rises* are simply stunning and slick thanks to the beefed-up Adreno 320 graphics chip. Even more amazingly, our Infinity never got too hot after completing a few races on *NFS*.

Given that the HTC One and the PadFone Infinity share an almost identical set of specs, it's no surprise that the two devices also have very similar benchmark scores. But that's not quite the case with our 1.6GHz Exynos 5-powered Galaxy S 4 (SHV-E300S, to be exact), which appears to be ahead of everyone in terms of 3D graphics and memory performance. That said, while we have yet to determine this particular S 4's battery life, it's safe to say that the PadFone Infinity should easily beat it thanks to the extra juice in the PadFone Station.



BENCHMARK	PADPHONE INFINITY	PADPHONE 2	HTC ONE	GALAXY S 4 (EXYNOS 5 OCTA)
QUADRANT 2	12,250	7,703	12,495	13,046
VELLAMO 2 HTML5	2,383	2,018	2,429	1,883
ANTUTU 3	24,697	15,489	25,140	27,805
SUNSPIDER 0.9.1 (MS)	868.3	1,291.9	853.5	779.8
GLBENCHMARK 2.5 EGYPT HD C24Z16 OFFSCREEN (FPS)	33	31	34	41
CF-BENCH	25,057	18,237	25,140	20,745

SUNSPIDER: LOWER SCORES ARE BETTER

As mentioned earlier, ASUS offers different charging policies to let you decide how to split the battery power between the phone and the tablet module. Here are the options: Intelligent mode for balancing the two devices' battery levels, Phone Preferred mode for maintaining a power supply to the phone and Power Pack mode for using the PadFone Station solely as a power pack (but you can hold the power key for two seconds to wake up tablet mode). These can be set in either the PadFone Assistant widget or in system settings.

To help further extend battery life, you can also toggle Smart Saving (either in Quick Settings or system settings) and choose one of several of modes. Ultra-saving mode disconnects the device from the network when it's suspended, whereas optimized mode toggles the appropriate screen brightness, network sleep time, CPU speed

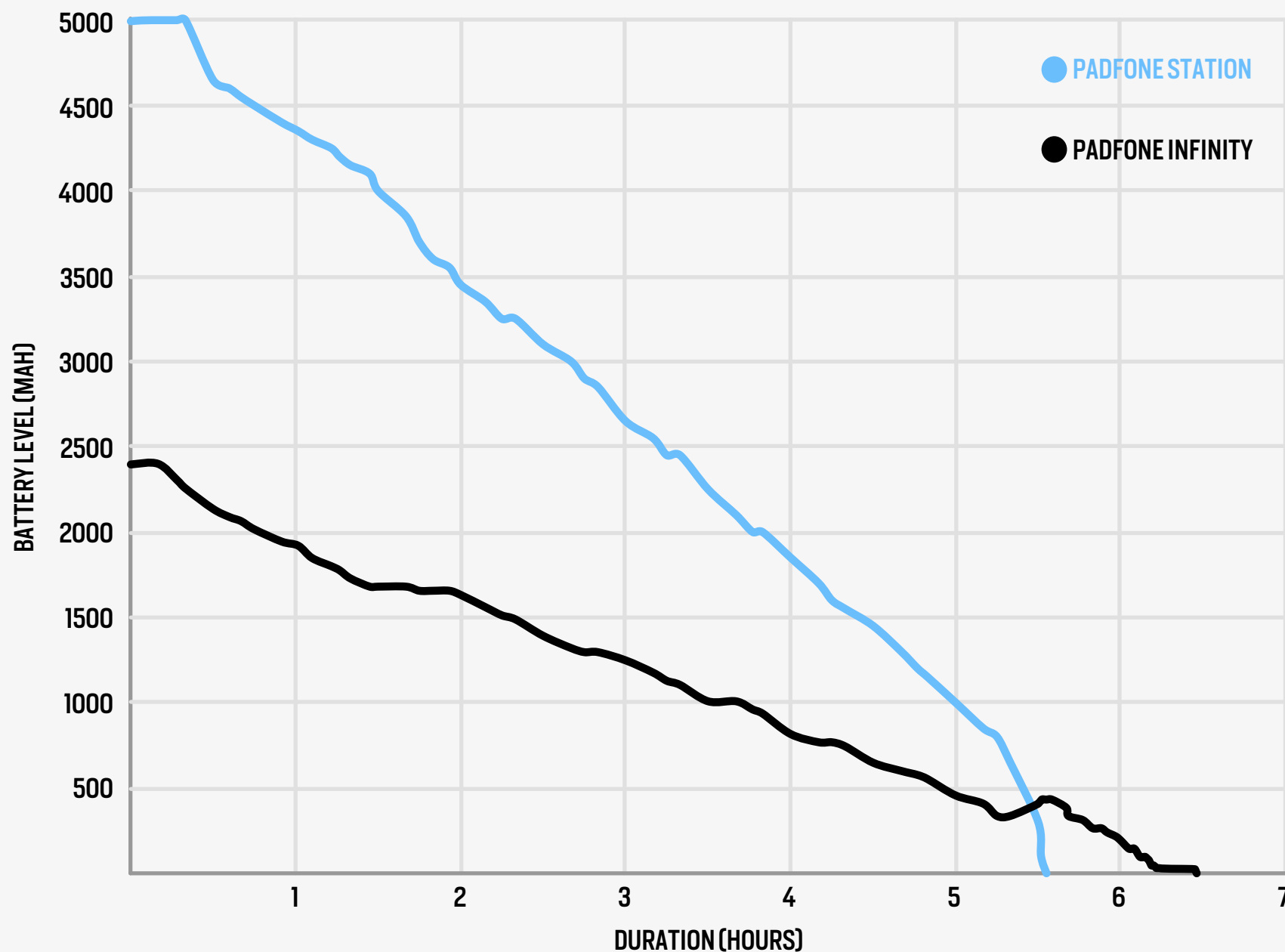
and number of active CPU cores in certain scenarios (like reading emails, reading e-books, browsing websites and watching videos). If you're feeling adventurous, you can tweak each of these individual settings as well under customized mode.

In our two rounds of battery tests, we set the phone / tablet combo to optimized battery mode, left it on a 4G LTE connection and set the screen brightness to medium, before letting it play a 720p video on a loop. Including the final hour when the phone was running on its own battery, we managed to get about 6.5 hours of continuous

We could easily survive two days with both devices on one charge.



ASUS PADPHONE INFINITY BATTERY RUNDOWN TEST



video. Funnily enough, when we repeated the same test with just the phone, we got about 5.75 hours of playback. But don't be put off by these figures, as our review unit was stuck at a location with a weak LTE signal (and we'll check again when we get hold of a different carrier's nano-SIM). Also, keep in mind that the batteries lasted far longer in everyday use; we could easily survive two days with both devices on one charge. For the record, too, the phone takes about 2.5 hours to be fully charged using the original power adapt-

er, whereas the tablet module takes about four hours, so be sure to plug your devices in well before you head out the door.

WRAP-UP

The PadFone Infinity is without a doubt the best phone ASUS has ever made, and it's a worthwhile upgrade from the PadFone 2 even for the specs alone. Thanks to that brand-new industrial design on the phone itself, we're confident that it'll get more attention than its two predecessors did. Pretty much






The Infinity, when docked, is only 15g heavier than the iPad 4.

everyone we've shown the device to praised the new look. While we're less concerned about the problematic new apps since they can be updated, we hope ASUS somehow finds a way to dampen the rattle of the docked phone.

But the question remains: can this new package convince more consumers that owning this is better than carrying two separate devices? As nice as the

PadFone is, this three-generation-old formula risks becoming stale if it doesn't break the mold. If ASUS wants to win over the non-believers, it'd have to come up with a solution that can let people use both the phone and the tablet module at the same time. That's right, dual-

screen multitasking. The closest thing we have right now is NEC's Medias W, but it's more of an experimental product and won't be produced in high quantities. Perhaps wireless display from the phone to the tablet module is the way forward? Do surprise us, ASUS. 

Richard is addicted to gadgets, even more so than a typical Chinese lad. Also looking after Engadget Chinese.

BOTTOMLINE

ASUS PADFONE INFINITY

HK\$6,588
(US\$850)



PROS

- Attractive aluminum design
- Slick tablet transformation
- Smooth and clean operating system

CONS

- Some new bundled apps are buggy
- Thick screen bezel
- Dynamic Display not fully compatible

BOTTOMLINE

The PadFone Infinity is almost everything that we had hoped for since the previous model, only to be hindered by some of its buggy new apps.





BUILDING XBOX ONE

An inside look at Microsoft's
play for the next generation
of gaming

By Ben Gilbert

Microsoft



THE ENGINEERS IN MICROSOFT'S windowless next-gen Xbox silicon lab are rattled. And understandably so. We're in their office, after all, and we have a mess of cameras in the one place you're not allowed to have cameras (or even cellphones). We're obviously outsiders on Microsoft's multi-building, security-heavy Mountain View campus, especially given our quartet of esteemed escorts: Todd Holmdahl, Ilan Spillinger, Nick Baker and Greg Williams. These four gentlemen are leading the charge on both Microsoft's Xbox One and, perhaps more importantly, a major effort to internalize silicon architecture at the traditionally software-focused megacorp.

The skittish engineers aren't worried we'll film the mess of 24-inch LCD screens running video-compression tests, or the rows of desks with water hose stations used for temperature stress tests, or even the sea of circuit boards in various states of disrepair — that's all standard for any Silicon Valley computer lab. It's really just a single chip that's causing concern: a custom-built Microsoft SoC that sits at the heart of the Xbox One. It's this SoC that has us in Mountain View, Calif. — in Silicon Valley, literally down the road from Google — a mere five days before Microsoft unveiled its Xbox One console to the world. Over six hours the previous Friday, we learned not just about that SoC, but also how the company plans to utilize it in the new console. We spoke with its four lead hardware architects. We toured the labs where they are testing the silicon, and where the next-generation Kinect was born. What follows is more than a look behind the sili-





Principal Design Lead Mike Love and Principal Design Verification Engineer Padma Parthasarathy (right) put Ones through the wringer in the lab.

con that drives the Xbox One — it's a deep dive into the changing approach Microsoft's taking to creating devices.

HIDDEN SILICON IN THE VALLEY

Considering there are large Microsoft logos emblazoned on both the buildings and signs at each entrance to the campus, the company's Mountain View location isn't exactly "hidden." What the people are doing inside, however, is one of the only secrets about the company's next-generation Xbox that *hasn't* leaked. It's at this location that Williams and Baker — the Xbox silicon development general manager and Xbox architecture distinguished engineer, respectively — drew up the silicon architecture for Microsoft's Xbox One.

In the first Xbox, Intel and NVIDIA crafted the silicon. In the case of Xbox 360, it was more of a joint effort between Microsoft and ATI / IBM. Though Microsoft's still working with AMD to build out some of its chips this time around, it's also invested millions of dollars in building



out verification facilities (among others) on-site in Mountain View and doubling the amount of in-house engineering dedicated to silicon. Holmdahl explains:

“In the consumer space, to control your destiny, you can’t just rely on commodity components. You have to be able to make your own silicon. It helps with performance; it helps with the cost; it helps make your product smaller; it helps you create your own IP (always a good thing). I’ll argue you’re a lot more flexible — you’re not relying on somebody else’s schedule; you make your own. So we’re obviously heading that way. The stuff we’ve done over the last 13, 14 years is one example of that within Microsoft. And you’re gonna see more and more of that, is my guess, as you go forward.”

For now, silicon’s a teensy component of Microsoft. Of the company’s approximately 95,000 employees, the silicon team is around 200 people, or roughly 0.2 percent of the total workforce. Double that if you count the system engineers working on next-gen gaming hardware — the console, Kinect and accessories — and that’s still nothing compared to most dedicated chipmakers. Intel employs over 100,000 people, for instance, while NVIDIA employs around 7,000.

However small, Mountain View’s 200-person team has been working heads-down for the past several years to verify its silicon architecture and get it “first time right.” That’s not to say that the chip returns perfect from manufacturing, but that it doesn’t run into any major issues — of course, there’s a small team within the larger group that’s dedicated to debugging. As Xbox Hardware Group Lead Holmdahl points out, “One transistor can mess up your day really badly,” setting the team back months to try and isolate the issue. Unlike software development, you can’t quickly (or cheaply) iterate on silicon implementation. Worse, the equivalent of “debugging” is a guesswork process. “The fewer times you have to redo it, the faster you can put your product on the market,” Holmdahl adds, with a nod to the business logic that also drives that need



for “first time right.”

“We booted the OS within days of getting the SoC back,” Williams says; a good indicator their initial architecture design wasn’t tremendously off. “I’m proud to say that, in our schedule, we didn’t have any major showstoppers.

“It’s extremely hard. It’s a matter of breaking it down. There are ways you can determine ‘is the right thing happening as an input into the chip, or is it illegal?’ And within the chip, there are ways we can instrument on this board and with the silicon to bring signals about to say, ‘Well, within the chip, we think it’s maybe between these two blocks,’ and to try to get access into that signal. Of course, when you’re highly integrated ... that’s not as easy once you’ve actually built it. That’s part of the art, essentially, of the process.”

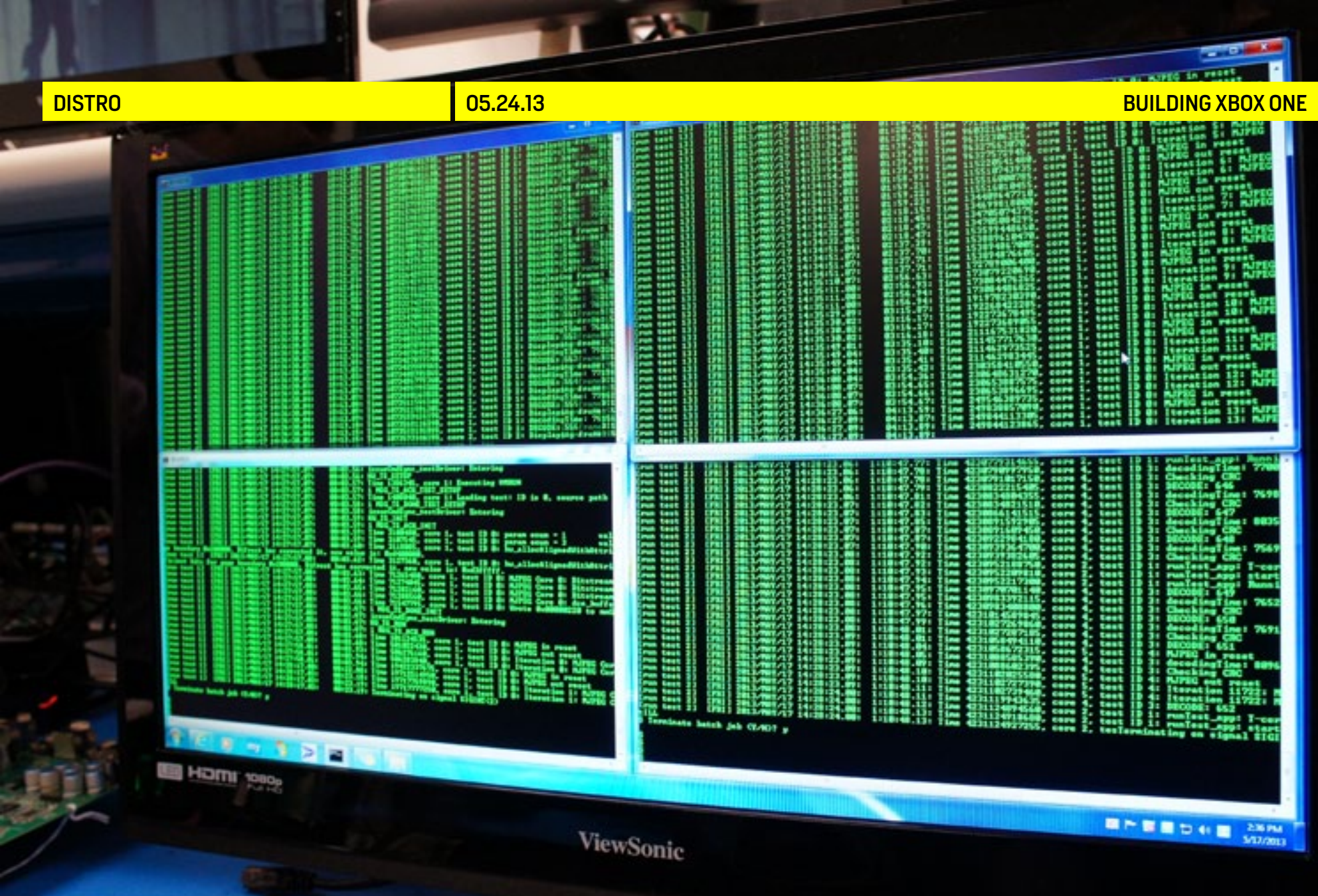
That “art” he’s speaking to applies across the entire spectrum of console development. For every generation, console manufacturers play a guessing game with internal specs, software / storage-medium support and a variety of other factors, hoping that they’ve prepared enough to support both aggressive initial interest and long-term attention from consumers and game developers.

POWERING THE LIVING ROOM OF THE (NEAR) FUTURE: ‘XBOX ON’

In-house silicon is at the core of what makes the Xbox One tick. It provides the structure that enables the console to run two operating systems at once for instant multitasking, and for the new Kinect to dish out much more information than before (to the tune of 2 Gbps). Most importantly, the five pieces of custom silicon spread across the console and its new camera peripheral helped the Mountain View team support their vision of an “always-on” console. Rather than use your hands to turn it on *like a baby’s toy*, simply saying “Xbox On” will immediately wake the new Xbox.

“The box will pop on and come to your home page or wherever you were last. In order to do that in an efficient way, you have to architect all of that into the box up front.





A look into the matrix: this station runs the One's SoC through a battery of tests during the debug process.

A lot of it is in the SoC,” Holmdahl says. That SoC contains both the CPU and GPU, as well as embedded ESRAM; the first two components are based on an AMD design, and custom-built into an SoC with that embedded memory. That CPU is based on the Jaguar design from AMD, with eight cores and a 4-megabyte L2 cache, while the GPU is of the D3D11.1 (with extensions) variety, Baker maintains.

The console runs in multiple power states, which means it runs in a low-wattage setting when not in use. (Microsoft wouldn’t give us specifics other than to say, “The system is designed for an SoC up to about 100W, but will vary on the scenario.”)

“If you look at the instant app-switching, if you look at multiple OSes, if you look at power consumption — that placed a lot of the main constraints on what we did on the silicon,” Baker tells us. Some of the silicon design was derived from data center concepts, as that was the only parallel in computing available. “You’re trying to make that technology seamless for the living room. It doesn’t mean



we need 64-bit CPU architecture. We're talking about many, many cores so you can run these tasks in parallel. We wanted to be able to support 8GB [of RAM] out of the chute, to probably support virtualization, which is what you need for running multiple operating systems. That's just a lot of making sure you have the right security systems in place so things don't stomp on each other."

In-house silicon also powers the other crucial component driving Microsoft's vision for the Xbox One: the new Kinect. Improved cameras and acoustics, not to mention a sleeker form factor, are all nice changes; it's discussing the new CMOS sensor's processor, however, that gets Spillinger, a passionate, intense gentleman (whose lovable accent sadly doesn't translate to text), visibly giddy.

"The highlight of the story is the CMOS sensor, which we developed internally," Spillinger says. "This design was done completely, 100 percent on this site. This is brand-new technology. There is discontinuity between this technology and the first Kinect; from the technology perspective that we are using for depth, for 3D measurement. So this was done here. On this one, this was a complete Microsoft custom design, where our engagement is directly with the manufacturer. It's not with any third party. We did the work. We do the qualification of the parts. We do the validation of the parts. We have done everything on this one."

If it isn't clear enough from that, he is a beaming father when it comes to the next generation of Kinect. And yes, you read that right — your old Kinect won't work with the Xbox One.

Spillinger joined Microsoft just as the company was beginning work on the first Kinect (then "Project Natal"). He hailed from IBM, where he led the team that created the Xbox 360's CPU. At the time (early 2008), he thought he was joining the Xbox hardware team to get started on a next-generation gaming console.

"First I was the design architect in Intel, then a design manager at IBM, and when I joined Microsoft, the view was



‘Okay, it’s about time — early ‘08 — to start to think about the next gen,’” he says. “It didn’t take us five and a half years to get there, because what happened is that the moment sort of turned around and we started development of Kinect. The entire focus was about shipping Kinect, which now, if you in retrospect see, is such a great success.”

The first Kinect did indeed sell very, very well for Microsoft — 24 million as of this past February. Microsoft’s decision to refocus on a new Kinect with much-improved audio recognition makes sense — many users employ the first model solely as a HAL 9000-like order-taker. Beyond “improved acoustic models,” Holmdahl says the new Kinect can track whoever is speaking using a “beam array” on the video side, which works with the audio side. It can identify, “exactly who is talking, and then be able to subtract out other people in the room so you get a really clear audio signal into your box.” As time goes on, he promises that Microsoft will push out improvements to voice recognition and commands, and, “At some point, we’ll be able to have conversational understanding.”

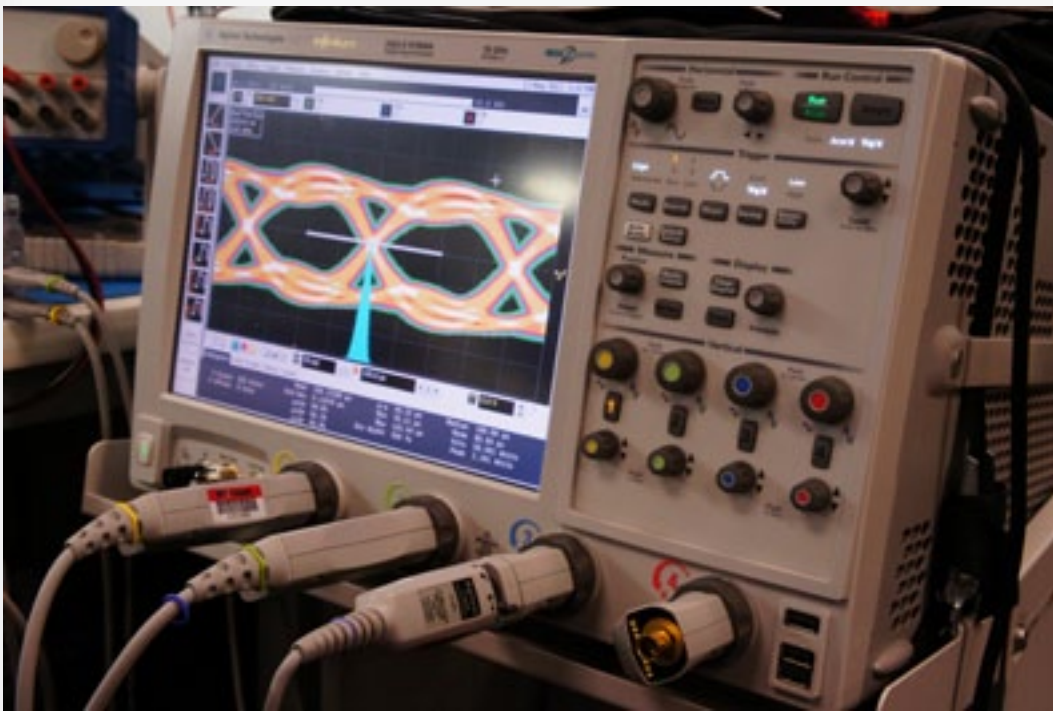
If that isn’t HAL, what is?

INSIDE THE SILICON LAB

Like so many other engineering labs, the one we’re touring is pumped full of cool, conditioned air, very white and rife with LCD monitors. A visually demanding scene from *The Avengers* plays on loop, putting stress on various iterations of circuit boards, while very smart, very young engineers monitor nearby workstations flooded with code. A handful of monitors display a basic dolphin animation that Microsoft uses in-house — if the dolphin’s moving, you’re in business (essentially). Another few are running a very pared-down version of an Xbox Dashboard, which looks similar to that of the 360 (or perhaps more apt, that of Windows 8’s Live Tile arrangement) — the system says “Hi” and seeks a user, which the engineer quickly skirts on the debug hardware using a wired Xbox 360 controller.

Black tubes protrude from the workstations, pumping hot and cold water into the lab for stress testing (and the





Microsoft's "bring up" lab, where the One's heart was built (top) and an electrical signal analyzer glares at onlookers with both eyes open.

occasional multimillion-dollar water fight, we imagine). CPU sockets sit unused, next to racks of circuit boards running the SoC through the virtual gauntlet. In one corner, a massive 4K television is seamlessly playing two HD video streams from a single box. Though the Xbox One is capable of pushing and receiving 4K signals, this test station is an illustration of how Microsoft's architecture went into the console's SoC (not a demonstration of its raw power). Spillinger says that the new console's ability to decode multiple HD streams at once is a measure of his team demanding specific silicon design from third-party partners.

"When we talk about the SoC and the general-purpose SoCs out there, this is per our requirement," Spillinger tells us while we huddle around the station.

"This is our aggressiveness to have two HD streams being com-

pressed, decompressed. It's actually a parallel circuit, it's not part of the CPU / GPU — it's an add-on."

A tray full of the much-celebrated SoCs sits unceremoniously next to an electrical signal analyzer. "Definitely no photos of that one!" Williams half-jokes as he hands us a

BLACK TUBES PROTRUDE FROM THE WORKSTATIONS, PUMPING HOT AND COLD WATER INTO THE LAB FOR STRESS TESTING (AND THE OCCASIONAL MULTIMILLION-DOLLAR WATER FIGHT, WE IMAGINE).



dead SoC to examine. This room and its many stations is the first of several we tour, and it's a good place to start, given what it symbolizes. The depth of hardware verification taking place in Mountain View is unprecedented for the software company, and offers further evidence of its internal silicon investment.

MAKING A FAKE VIDEO GAME CONSOLE

Principal Design Verification Engineer Padma Parthasarathy has a bowl full of M&Ms on her desk, right next to the door, which she invites guests to indulge in. Next to that, her computer is running a software virtualization of a game console. And that's her job — as “principal design verification engineer” — to verify whether or not all the bits and pieces of the chips driving Microsoft's next Xbox are working as they should be. It's part of the ongoing process the company's set up to create its own silicon, and it's an important step. Without people like Parthasarathy, chip development could go from a few years to a decade or more. She is yet another fail-safe in the endless quest for “first time right.”

In her little office, on a standard desktop computer, the logic behind the Xbox One is running — from a server farm on campus — through a variety of test scenarios. She can log issues on hardware that doesn't exist yet, essentially troubleshooting a game console being faked by software on a server farm (its components, anyway). Given the complex nature of the virtualization, tests can only be processed at a fraction of actual run speed, but it's still one of the best ways to troubleshoot hardware ahead of mass-producing millions of units.

Parthasarathy's time with Williams and others on the team goes all the way back to the 3DO. “She has been the architect of the verification team for all of these years,” he tells us as we leave for another part of campus. She's been with Microsoft since 1998, when it absorbed her team (and Williams') in an acquisition. It's people like Parthasarathy that are helping bridge the gap between the company's old approach to gaming hardware and its future.

The next step in faking a game console requires a giant machine that needs its own HVAC system, of course. The





The meat locker is Microsoft's thermal testing chamber, full of zebra-taped Ones to be debugged.

spaceship-like device originates from Cadence Design Systems, and serves to run a variety of processor emulations. A peek into its innards reveals all sorts of hoses and wires, akin to opening a panel on a Willy Wonka candy machine; an even larger machine sits outside the building, powering its test conditions. Our friend the dolphin shows up once more on a monitor displaying what the emulator is up to, but his movement is imperceptible due to the speed of the emulation. Next up is a significantly smaller lab with what looks like a standalone meat locker. The meat locker has a manned workstation in front of it, where one very unlucky engineer spends his time logging issues registered by the consoles being tested within.

Before long, the four gentlemen who architected the Xbox One lock our video producer Ben Harrison in that meat locker — which is actually a temperature chamber for running the console through a variety of thermal extremes. The chamber is full of hundreds of variations of prototype Xbox hardware — today, it's set to very cold —



and is vital in determining how the Xbox One stands up to extreme thermal conditions. With laughs all around, he's freed from the icy, zebra-filled prison. Surprising no one, the various beta kits of the console itself, the controller and the new Kinect all sport zebra-pattern tape to hide their shape (as rumored). What wasn't known is that the zebra tape serves a purpose: it's used in product design specifically to hide angles from sneaking photographers, and is usually employed by the auto industry. The final version of the console looks damn similar (if not identical) in shape and design to the developer beta kits, and Microsoft is understandably leery of leaks. At this point, though, the cat's out of the bag.

THE VIRTUAL CONSOLE BECOMES REALITY

When Holmdahl lifts the dark cloth off a black, rectangular box, a gamepad and the new Kinect, it's the first time some of his own colleagues have seen the final designs. Not a beta kit with zebra tape, or a mockup, but a presentation-ready prototype. As we stand around the hardware placed on a little circular table, the concept of the box "slipping into the home entertainment center" is mentioned. The Xbox One is no "inhale" — it looks like a little computer with a slot for discs. It's got a two-tone finish of alternating black matte and gloss, with a slot-loading Blu-ray disc drive and its power button greeting users out front. It's ... well, it's not such a looker. At least not thus far — anything could change by the time it ships, though it seems doubtful the form factor will change dramatically.

The gamepad, similar as it is to the 360's, is both smaller

WHEN HOLMDAHL LIFTS THE DARK
CLOTH OFF A BLACK, RECTANGULAR
BOX, A GAMEPAD AND THE NEW KINECT,
IT'S THE FIRST TIME SOME OF HIS OWN
COLLEAGUES HAVE SEEN THE FINAL DESIGNS.




and chunkier all at once. Though it's designed to be sleeker all around — shortened analog sticks, a shrunken battery pack area, a lack of screw holes — we couldn't help but think it looked a bit rough around the edges. It has a distinct "mid-'90s vision of the future" look to it. And it's certainly not helping that the 360 gamepad is considered by many to be the best game controller ever built.

Kinect also got a visual makeover, and looks the nicest for the revisions. For starters, only one eye glares at you from the front, and the new chassis is a clean update to a clunky, aging peripheral. Unlike the Johnny Five-esque look of the original Kinect, the second version deserves the prime placement in living rooms that it demands.

THE FIVE

"In different levels, we were working on five custom-designed components. Silicon components. Three of them going to the console and two of them to the sensor," Spillinger explains. That's the SoC that drives the console, the CMOS processor in the new Kinect, I/O integrators in both Kinect and the console and a digital signal processor on the Blu-ray drive. For the four gentlemen who show us around the Mountain View campus and scads of others we don't meet, getting to the point where so much of that silicon was designed and verified in-house is the fruition of years of work.

It's a major shift away from the company's past reliance on external partners, with only AMD serving as collaborator this time around. And like any game console launch, it's another huge investment for the next... five, eight, 10 years? That's an unknown, of course, but it seems likely based on history that we'll have the Xbox One for the foreseeable future. Whatever the future dictates, it looks like we'll see internally developed chips in many of Microsoft's products going forward. 

Ben Gilbert is a Senior Associate Editor at Engadget, where he tends to write about video games. He loves a great breakfast, is obsessed with media, and recklessly employs serial commas.



A close-up, low-angle shot of an Xbox One console and its wireless gamepad. The gamepad is in the foreground, showing the D-pad, analog sticks, and the four colored face buttons (A, B, X, Y). The console is in the background, showing its distinctive ventilation grille. The lighting is dramatic, with a strong green glow from the background.

XBOX ONE

HANDS-ON

First Impressions of the
Console, Gamepad and
Kinect 2.0 prototypes
By Ben Gilbert



WE GASPED OUR WAY THROUGH THE LIVEBLOG. We brought you news of the specs and the software and everything else. But now it's time to take a deep dive into Microsoft's next-gen console and what it might mean for Earth's living rooms. Engadget was given exclusive access to the hallowed labs at the heart of this project and to the engineers who made it happen. We got to play with prototypes of the hardware and to discover firsthand whether Kinect 2.0 really can tell if we're winking. Read on, and we promise to spare you no detail.

We ought to mention something you *won't* find in this hands-on, and that's our usual barrage of photographs and video. Microsoft's hardware wasn't final, so our access to it was granted on two conditions: First, we had to leave our DSLRs, phones and shirt-button spy cams at the door. And second, we had to accept that there'd be limits to what we could try out and to what we could ask, seeing as so much must be deemed commercially sensitive at this point. We figured these conditions were fair enough; and if the new Kinect works in the dark (which it does), then so could we. Plus, we at least have eyes-on shots from the unveiling event.

KINECT 2.0

This might seem a strange place to start, considering that motion control is a still relatively small part of the current-gen console experience. But when you realize what the new sensor is capable of, it'll all make sense.

Alas, we weren't able to play any Kinect games. Instead, we were shown a demo of a developer program that showed all the new Kinect camera systems function-





The new Kinect's IR sensor and its 250,000-pixel resolution are capable of tracking joints, fingers, facial expressions and calories burned.

ing individually. These systems consist of regular camera components that allow for 720p Skype action as well as helping with visual authentication of users, plus an IR sensor that uses the time-of-flight of photons to measure the depth of objects.

The IR sensor works off infrared light emitted by the Kinect module itself and it had no problem capturing our group even with extremely low light. The same goes for extremely bright light, all of which we were shown in a terrifying low-budget-movie-set-esque room containing an incomplete female mannequin. Despite our best efforts to lose the skeletal tracking, and to break its new depth-sensing capabilities against nearby humans, we were often stymied. It's still not perfect by any means, but it's also still far from finished.

Presumably thanks to its 250,000-pixel resolution, we saw the IR module tracking joint rotation, facial expressions, individual fingers, open / closed eyes and even how many calories we were burning as we moved around. Oh,



and it can track up to six people at once — although things got a bit spotty for us with everyone standing relatively close together.

We also put it to the traditional “couch test” to see how well it picked us out from a couch-like background — in this case an office chair with a cloth draped over the front to provide a background for our legs. But at that point, one of engineers was quick to jump in and point out that such a test isn’t one of hardware, but of software. “This is a software and algorithmic question,” he said.

“We are targeting [couch detection], yes. The biggest question — and this is the billion-dollar question, is ‘Will it be the experience that it really needs to be?’ And we know it.”

Overall, it’s easy to see how all that new info that Kinect can detect could dramatically affect the games of tomorrow.

THE NEW WIRELESS CONTROLLER

There were no game demos for the gamepad, but we were allowed to grip it in close, personal detail. Visually, it’s a bit less striking than the 360 gamepad, with an air of false futurism; a slight awkwardness of proportions, perhaps, but it was mostly a positive experience.

The biggest addition was definitely the “impulse triggers” — essentially, little rumble motors built into each trigger, which allow you to “feel the kick in the trigger,” as one of the engineers put it. The triggers felt otherwise very similar to that of the current 360 gamepad, though they’re a bit larger, have more rounded edges and the gap between them and the shoulder buttons is non-existent.

Continuing on the rear of the gamepad, the battery pack area was shrunk into the controller. The one we saw employed two AAs, like the 360 gamepad, though it’s always possible that’ll change before it’s final. There is a micro-USB port at the top of the controller and an “accessories port” in the usual headset port position. Both grips on the bottom are slightly smaller than before, which we were told was a deliberate ergonomics decision.

Out front, the Xbox Home button is a bit higher, but in





"Impulse triggers" get in on the rumble action and thumbsticks have been retooled for added comfort on the new wireless gamepad.

the same central position (which should help it get out of the way of accidental pushes), and the start / select buttons remain in the same place as they are on 360. There's no Share button here, but there's a redesigned d-pad that falls in line with industry standards. It's an equilateral cross which feels clicky and directional, just as d-pads ought to feel; certainly a step up from that of the 360. Plus, it appeared to take up less space.

The thumbsticks have seen significant alteration. They're shorter and have a newly designed edging to keep your thumbs from slipping off. We can verify that this does, indeed, keep your thumbs planted, and we look forward to putting it to the test at the controls of a Warthog in the not-so-distant future.

The four standard A / B / X / Y face buttons are just about identical to the 360 gamepad and again the overall philosophy seems to be pretty conservative. In this regard, one of the engineers specifically mentioned that there was no desire to "add a bunch of gimmicks like putting displays on it."



PROCESSOR(S) AND PERFORMANCE

So much for the Kinect and controller, but what about gaming and performance? Again, there were limits to how far we could explore, but we did manage to get enough detail from the engineers to help us form some idea of likely performance, beyond their general claim of an eight-fold improvement. So, rather than just skip this whole area, we'll do our best to relay what we know and what we're able to estimate.

At this point, it's worth mentioning that there are five unique pieces of silicon in the console, including a heavily customized APU taking care of computing and graphics, two further input (southbridge) and signal processors in the box and two more in the Kinect. The overall impact of all these unknowns is to create a box of mystery that cannot be compared to anything else on the market, or even to the PlayStation 4. Just something to bear in mind!

If you were concerned that the inclusion of AMD's low-power "Jaguar" cores somehow meant the new Xbox would be a mobile-class device, or the type of thing you'd stick in a dashboard infotainment system, worry not. The APU burns at up to 100W, which is actually more than the latest iterations of the Xbox 360 Slim or PS3. Moreover, transistor size has been reduced to 28nm, which means

that the performance per watt will also increase relative to the 45nm processors of the last generation. Comparisons to any existing AMD APUs in desktop PCs are rendered moot by the fact that there is an unusual amount of transistors all working together in the Xbox system (around 5 billion) and, un-

AMD's silicon is packed inside, but fine-tuned components make for difficult comparisons to current desktop APUs.



like the sprawl of a regular Windows desktop PC, they're honed and focused on very specific tasks.

The way memory is used in the new console is also fundamentally different and hard to predict. In addition to a 32MB cache of high-bandwidth embedded SRAM (versus 10MB of EDRAM in the 360), the CPU and GPU both share the same block of 8GB DDR3 memory and they do so in an interesting way, with no need to copy data that is shared between the two components. This could potentially improve performance relative to a traditional system, such as a gaming PC, which has a discrete GPU and a traditional architecture that moves data in a more convoluted manner.

NOISE

All those watts need to be cooled, but we're told that the new Xbox will be "four times quieter" than its predecessor. This stat is almost impossible to grasp without some math, so let's try it: *Anandtech* has measured the noise of the Xbox 360 Slim under load at 45dB. As a rough benchmark, subtracting 3dB halves the perceived noise, which means we could be looking at 39dB for the next generation — still audible, but only slightly above the likely 35–37dB noise floor of your living room.

Microsoft told us that it's made other changes to reduce noise, with low-power states that keep the console active (e.g., for the purpose of voice activation) at very low wattages. We're also informed that games will automatically be ripped from their Blu-ray discs, which should reduce the console's reliance on noisy motors. As an added reassurance, the deafening whir of the first 360s and PS3s

**DESPITE EVERYTHING WE
SAW AND HEARD DURING OUR
REDMOND ADVENTURE, THE NEW
XBOX IS FULL OF UNKNOWN.**




from 2005 / 2006 should be a thing of the past: those old Hoovers consumed as much as 200W under load.

GRAPHICS

There's not much we can say about the GPU at this point except that it's designed to work with DirectX 11.1 APIs, which implies that the same graphical tools and techniques that developers currently use for PC games should port across pretty easily to the new console.

We also know that the console will handle 4K output and that it'll also be able to deliver multiple "panes" of 1080p. For example, it could render two panes for a game (one for the environment and one for the HUD), plus a third pane on top for background system tasks (such as a Skype chat). It's hard to say what all these separate panes will be used for — AR goggles and IllumiRoom both spring to mind — but the point is that they must require some serious grunt.

Having said all of this, we come full circle to the theme of this article: despite everything we saw and heard during our Redmond adventure, the new Xbox is full of unknowns. The Kinect hardware looks revolutionary, but will depend on software. The controller seems conservative, but isn't finished. And if we had to hazard a guess about performance, we'd say that Microsoft's customization of the console's silicon won't deliver unheard-of levels performance, but will instead allow the relatively low-wattage system (low relative to, say, a gaming PC) to punch well above its weight and keep up with the competition from Sony. In terms of differentiation, it'll boil down to non-hardware factors: namely Kinect apps and games and how the console hooks up to the rest of the Windows ecosystem, and those happen to be exactly Microsoft's strong points. 

Sharif Sakr contributed to this post.

Ben Gilbert is a Senior Associate Editor at Engadget, where he tends to write about video games. He loves a great breakfast, is obsessed with media, and recklessly employs serial commas.



ESR

ROY THE ROBOT

DISTRO
05.24.13

VISUALIZED



PHOTOGRAPH BY WILL LIPMAN

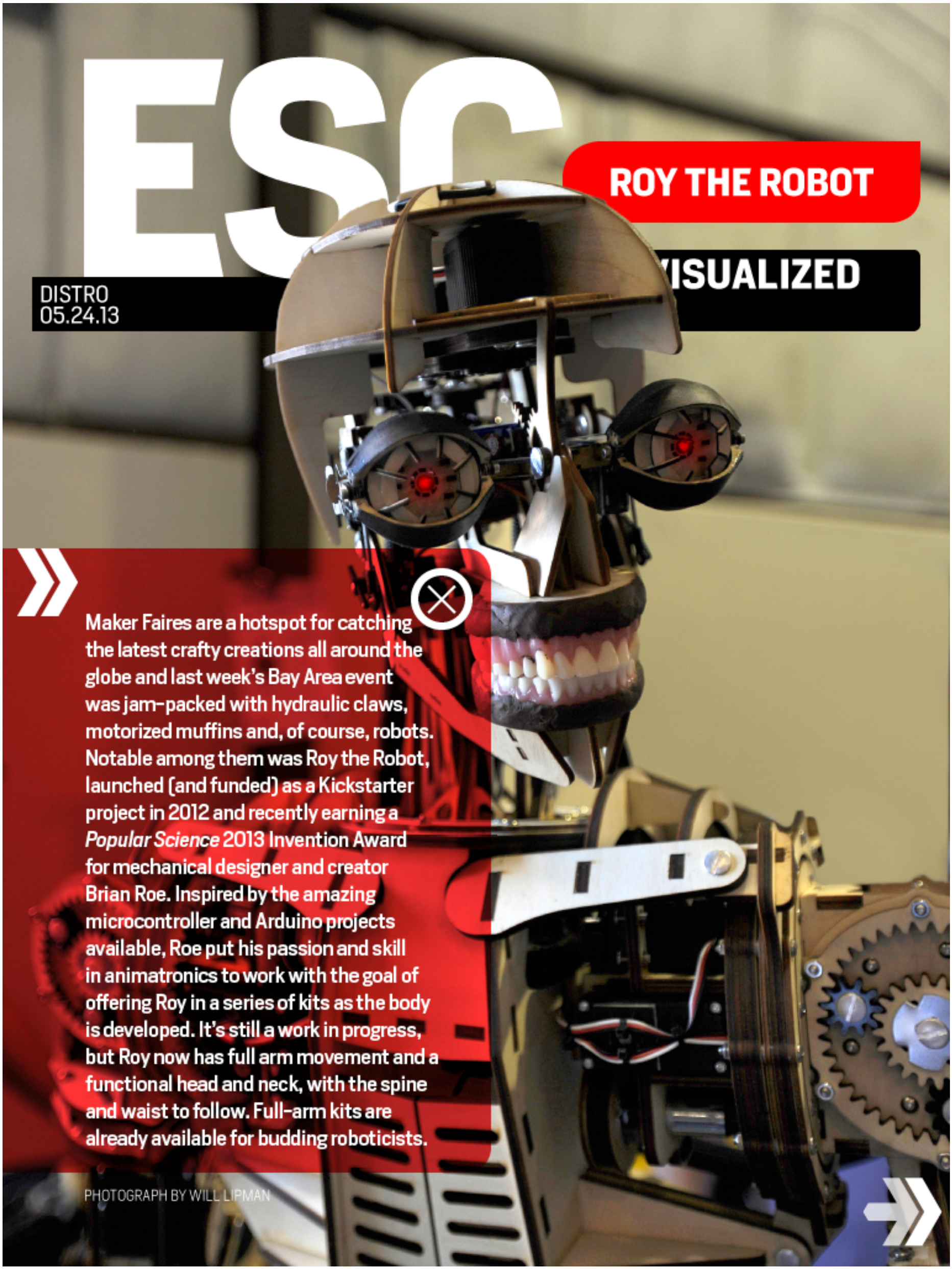


ESR

DISTRO
05.24.13

ROY THE ROBOT

VISUALIZED



Maker Faires are a hotspot for catching the latest crafty creations all around the globe and last week's Bay Area event was jam-packed with hydraulic claws, motorized muffins and, of course, robots. Notable among them was Roy the Robot, launched (and funded) as a Kickstarter project in 2012 and recently earning a *Popular Science* 2013 Invention Award for mechanical designer and creator Brian Roe. Inspired by the amazing microcontroller and Arduino projects available, Roe put his passion and skill in animatronics to work with the goal of offering Roy in a series of kits as the body is developed. It's still a work in progress, but Roy now has full arm movement and a functional head and neck, with the spine and waist to follow. Full-arm kits are already available for budding roboticists.

PHOTOGRAPH BY WILL LIPMAN

AMY MAINZER



THE ASTROPHYSICIST AND NASA SCIENTIST discusses the full-body typing experience and planetary preservation

What gadget do you depend on most?

My laptop is my brain and my memory. It's my means of interfacing with the much more powerful computers I use for astronomical data analysis. And of course, it's a powerful telecommunications station, so now it's also my eyes and ears.

Which do you look back upon most fondly?

My Apple //e computer. A good fraction of my childhood was taken up with playing games, coding simple programs and writing papers on it. It even taught me to type when I was 9! My experience with this computer at an early age was a critical turning point that has rippled through my career ever after. By playing some of the earliest text adventure games, I fell in love with computers, and my imagination soared to faraway places. Learning to type so young set me up for better jobs as a secretary than I would have otherwise gotten, allowing me to earn badly needed money for college. And of course, my early experiences made computers and coding much more comfortable than they otherwise would have been.

Which company does the most to push the industry?

I've used many different computers and operating systems over the years, and they're all pretty good. Apple has been a consistent force for change, and right now I'm pretty solidly attached to their products.



“The lightsaber app! Great for making points in meetings.”

What is your operating system of choice?

I’ve been a Mac person for a while. As an astrophysicist, having the Unix core underlying the OS is key, since virtually all of our software is Unix-based in some sense. It’s pretty widely used in the field, so that makes it convenient for collaborations.

What are your favorite gadget names?

Anything that combines bad puns with *Star Trek*.

What are your least favorite?

Anything that takes itself too seriously.

Which app do you depend on most?

The lightsaber app! Great for making points in meetings.

What traits do you most deplore in a smartphone?

Aargh, so hard to type with autocross! Tiny buttons combined with technical jargon makes for some interesting emails. Most of my friends have “iPhone names”

based on the most common mistakes I make typing.

Which do you most admire?

I admire the ease with which written, audio and visual communications have been integrated into one terrifying whole! It’s now possible to access the world’s entire library of scientific journals, check the weather, see your mom and read a book with one device. Thinking back to how tough it was to come by up-to-date scientific information as a child growing up in Ohio, I’m astonished at how readily available knowledge has become — provided you have access to the technology.

What is your idea of the perfect device?

The one thing I would really love to have is a laptop with a more convenient and powerful physical interface. Having to hunch over a tiny keyboard and stare at a smallish screen all day can be pretty painful physically. I’d love to see some bright person figure out a way to code using an interface like the Kinect — it would be so much fun to be able to wave your arms or jump up and down to type! I know there’ll be a reliable way to do this soon. Programming and scientific data analysis is awfully sedentary, so





NASA/JPL-CALTECH

NASA's Wide-field Infrared Solar Explorer (WISE) spacecraft prior to its December 2009 launch.

it would be great if we could find a way to make it more physically active. If there are any folks out there working on such a system, I'll be your beta tester.

What is your earliest gadget memory?
One of my earliest and favorite memories is dancing to *Sesame Street* songs on a kiddie record player.



What technological advancement do you most admire?

The transporter. Seriously, I can't wait for that.

Which do you most despise?

It's painful to see technology used for mass destruction of the diversity of life on Earth, like the explosives that are used for fishing on coral reefs. I love the crazy colors and mind-boggling diversity of the oceans, so when I first saw the effects of dynamite on this gorgeous, utterly unique environment, it was devastating. As an astrophysicist, I can tell you firsthand that there really is no place like home that we know of, so to see technology used to trash the place is truly distressing. We may know of lots of other planets out there, but we cannot get to them: here we are, and here we will stay for the foreseeable future. As a spacecraft builder, I can say with confidence that the *Star Trek* ideal of easy human interplanetary travel is not going to happen anytime soon. We must take care of our home.

What fault are you most tolerant of in a gadget?

Actually, I don't mind the autocorrect errors — as long as they're funny!

Which are you most intolerant of?
Planned obsolescence.

When has your smartphone been of the most help?

For any sort of navigation in a new city, the smartphone is incredible.

What device do you covet most?

I am really ready for that Kinect-style interface to the laptop. It would be so cool to code using *Fruit Ninja*-style moves!

If you could change one thing about your phone what would it be?

Create an application that lets you jump 10 seconds back in time (for cleaning up those pesky autocorrect typos, of course).


What does being connected mean to you?

Being connected means that work has become much more tightly integrated with the rest of life. This has plusses and minuses, of course! But the ability to connect with family and friends is priceless.

When are you least likely to reply to an email?

No emails while roller skating!

When did you last disconnect?

You can do that? 



IN REAL LIFE is an ongoing feature where we talk about the gadgets, apps and toys we're using in real life.

TYLT CABLES

I'VE SEEN SOME KOOKY cabling in my day, but TYLT is undoubtedly amongst the kookiest. There's really no rhyme or reason for the company's accessories looking the way they do, but it's fun. And sometimes, you just need fun. I've been using the Band and Y-Charge in my vehicle for a few weeks now to keep my gaggle of iOS and Android devices charged, and I've but a few com-

plaints. On the positive side, it's impossible to lose these things. They're bright, durable, grippy and just generally unlikely to fall between one's seat and the center console — you know, *the abyss*.

That said, they're better suited to tweens and the like than grown professionals. They'll liven up the interior of your car, and that may not be the vibe you're after when picking up clients who

rock suits and ties. It'd also be nice if the Y-Charge weren't quite so large — I picked up a two-port USB car charger from Amazon that just barely sits taller than the cigarette plug itself, which I greatly prefer due to its bantam stature.

Still, the company's got a pretty stout collection of quirky gadgets, and if it's a gift you're after, you can bet that something from TYLT will score high on the "unique" scale.

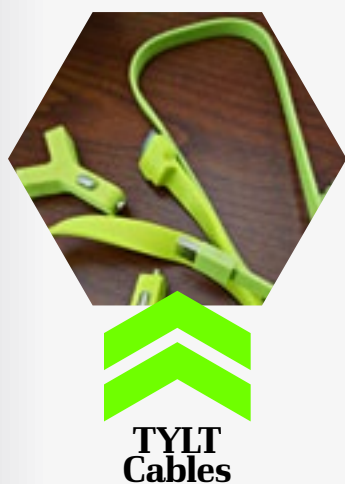
— Darren Murph



GS3
vs.
GS4



GS3 VS. GS4



WHILE OUR REVIEW of the Galaxy S 4 gave a quick glance at what it was like to trade up from the GS3, I thought it would be worthwhile to use both more extensively to see what differences would truly stand out after just such a switch. Is it worth being a compulsive early adopter in Samsung's universe? I got to find out by using both Bell and Rogers editions.

More than anything, I enjoy the surface-level improvements. The OLED screen is still dark in bright sunlight, but it's considerably easier to read in those harsher conditions. The PenTile effect is mercifully less noticeable at 1080p, too. The new hardware is easier to grip and use, even one-handed, and the white GS4 so far seems more resistant to scratches and scuffs than either the blue or white GS3. I'm

surprisingly okay with the plastic. While I ultimately prefer the build quality of the HTC One, the GS4 feels good enough — if about as passionless as a washing machine.

It's a tougher

call when you consider what's under the hood. The GS4 is indeed faster, but the speed is harder to appreciate beyond specific circumstances, like loading complex web pages or playing taxing games like *Real Racing 3*. Likewise, the 13-megapixel camera is sharper in low light, but it's not so much better than the GS3's 8-megapixel shooter that I would buy the GS4 for that reason alone. And both Galaxy generations are equally speedy on LTE: the GS4 on Rogers typically peaked at 35 Mbps downstream and 17 Mbps upstream here in Ottawa, which is roughly in line with what the GS3 managed on both Bell and Rogers.

As such, it's hard to imagine forking over the hundreds of dollars for an early GS4 upgrade. It's a fine phone and would be the perfect replacement for someone with a 2011-era Android phone like the Galaxy S II, but I'd have to be genuinely annoyed with the GS3's limitations to buy the 4 right now. Especially when many of the GS4's new features work only sporadically (see: waving my hand frantically to scroll pages), I'd rather spring for the One today, or bide my time for the GS5.

— Jon Fingas



The week that was in 140 characters or less

One More Confusion, Age Affectation and Buying a Vowel

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ESC

REHASHED

@Duckols

Also today, I went to GameStop. Me: "How do you guys feel about the Xbox One?" Store clerk: "We don't sell those anymore."

@hunterwalk

"patriotic" means many things, but Tesla paying back DOE loan nine years early fits my definition.

@jowyang

Will tumblr make yahoo young? Or will yahoo make tumblr old?

@markgurman

HTC releases HTC Touch, Apple launches iPod Touch and dominates. HTC releases HTC One, Microsoft launches Xbox One... HTC = Doomed.

@AlbertBrooks

First Flickr now Tumblr. Yahoo should spent at least one billion on an e.

THE STRIP

BY BOX BROWN



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TIME MACHINES

WHAT
IS THIS?
TOUCH TO
FIND OUT



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TIME MACHINES

SINCLAIR BLACK WATCH

At first glance, this could be a challenging Arduino-style project and the completed wristwatch could give Tokyoflash a run for its money, but unfortunately the geek factor couldn't guarantee its commercial success. The Sinclair "Black Watch" was released in 1975 as both a £17.95 DIY kit and a convenient £24.95 ready-built model sporting a five-digit LED display and two panels as the only buttons. The *Blade Runner*-esque wearable did have some fatal flaws, however. Its quartz accuracy was susceptible to temperature change; the 10-day battery life was unimpressive; and if the display

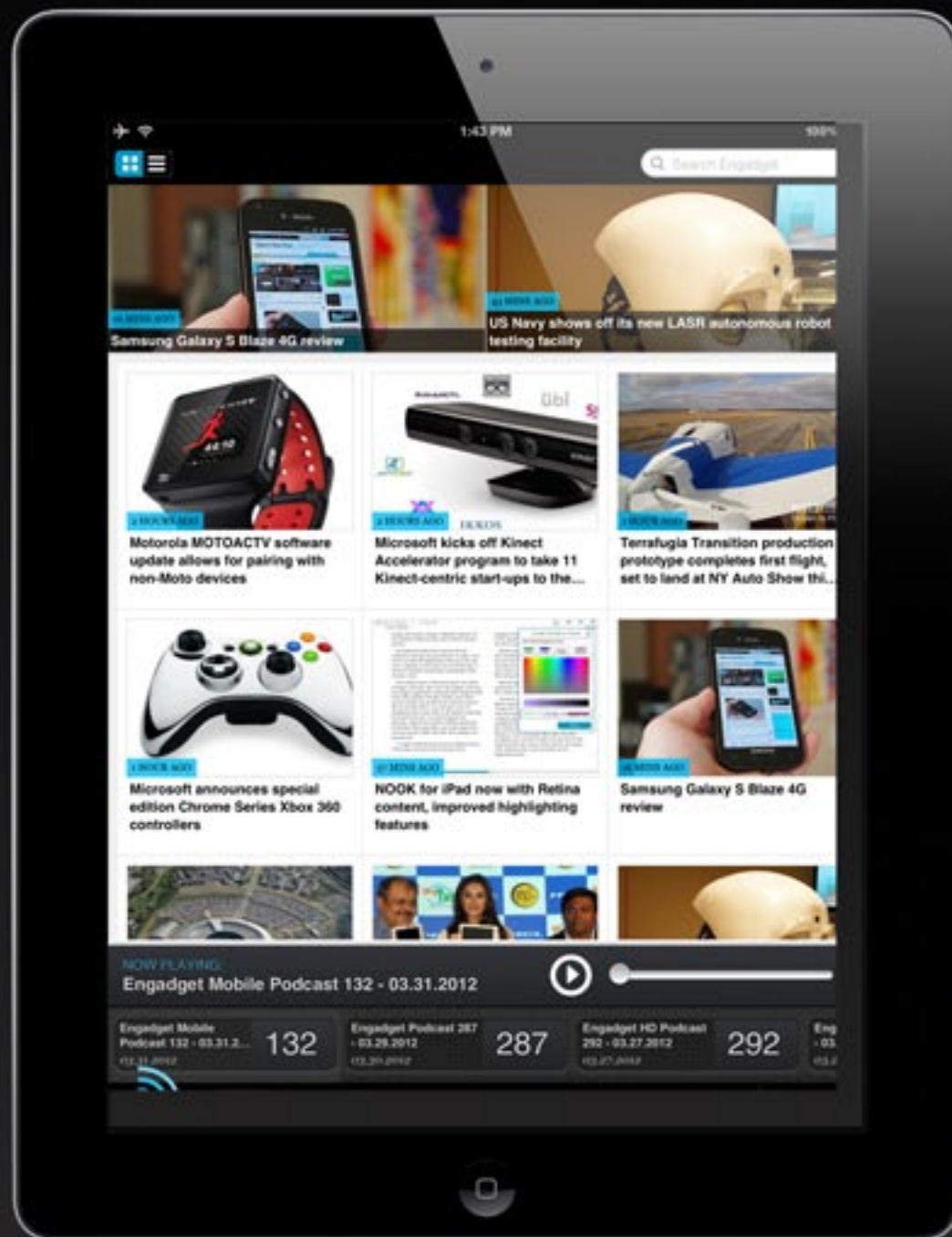
happened to get stuck in the on position, it was liable to explode. All that aside, it still seems like a tempting little timepiece, and our Pebble could definitely use a stand-in between charges.



SSPL/GETTY IMAGES (DISASSEMBLED); BILD-BY/WIKIMEDIA (ON WRIST)

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